REPORT OF
AIR POLLUTION SOURCE TESTING
OF AN ETHYLENE OXIDE EMISSION-CONTROL SYSTEM
OPERATED BY STERIGENICS U.S., LLC.
IN CHARLOTTE, NORTH CAROLINA
ON DECEMBER 9, 2019

Submitted to:

MECKLENBURG COUNTY DEPARTMENT OF ENVIRONMENTAL PROTECTION
700 North Tryon Street, Suite 205
Charlotte, North Carolina 28202-2236

Submitted by:

STERIGENICS U.S., LLC.
10821 Withers Cove Park Drive
Charlotte, North Carolina 28278

Permit Number 14-017-959

Prepared by:

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Prepared on:

December 15, 2019

ECSi

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TEST DATE

Monday, December 9, 2019

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TABLE OF CONTENTS

ECSi

LIST OF TABLES

ECSi

LIST OF APPENDICES

ECSi

1.0 INTRODUCTION

On Monday, December 9, 2019, ECSi performed air pollution source testing of an ethylene oxide (EtO) emission-control system operated by Sterigenics U.S., LLC. in Charlotte, North Carolina. The control device tested is an Anguil catalytic oxidizer, which is currently used to control emissions from nine EtO sterilizer backvents and two aeration rooms. The purpose of the testing program was to evaluate continued compliance with EPA requirements under the current National Emissions Standards for Hazardous Air Pollutants (NESHAP), and with the conditions established in the Air Quality Permit granted to Sterigenics US, LLC. by the Mecklenburg County Department of Environmental Protection (MCDEP).

2.0 EQUIPMENT

The EtO gas-sterilization system is comprised of nine commercial sterilizers, all discharging through dry screw or liquid-ring vacuum pumps to an Advanced Air Technologies packed-tower acid scrubber emission control device. The nine sterilization chamber backvents and three aeration rooms are all discharged to an Anguil catalytic oxidizer emission-control device. The gas-sterilization and emission-control equipment consists of the following:

- Nine Gas Sterilizers, each comprised of a steam-heated sterilization chamber (varying in size from 2500 to 5300 cubic foot volume), a dry screw or liquid ring recirculating vacuum pump chamber evacuation system ("chamber vacuum vent"), and a backdraft valve ("chamber exhaust vent");

- Three aeration rooms, each comprised of a heated aeration chamber and a chamber exhaust system

Sterilizer vacuum pump emissions are controlled by:

- One Advanced Air Technologies Safe Cell emission-control system, comprised of a packed-tower chemical scrubber, equipped with a packed reaction/interface column, a scrubber fluid recirculation system, a scrubber fluid reaction/storage tank, and a dedicated blower exhaust system.

Sterilizer backvent and aeration cell/room emissions are controlled by:

- One Anguil Catalytic Oxidizer, rated at 10,000 SCFM, equipped with a prefilter, a natural gas heater, an exhaust gas heat exchanger, two reactive catalyst beds, and an exhaust blower.

3.0 TESTING

EtO source testing was performed in accordance with the procedures outlined in CARB Method 431, the USEPA approved alternate method to the procedures listed in 40 CFR, Part 63.365, subpart O. EtO concentration measurement for each test run will be conducted simultaneously at the inlet and outlet of the catalytic oxidizer during chamber backvent, and during a one-hour interval of the 24-hour aeration process. A total of three chamber backvent test runs, and three one-hour aeration test runs, were performed.

During backvent and aeration testing, EtO concentration at the inlet and the outlet of the catalytic oxidizer were determined using direct source sample injection into the gas chromatograph (GC). All backvent and aeration testing was performed using freshly sterilized product. The testing program was conducted in accordance with the procedures outlined in the following sections.

4.0 RULE/COMPLIANCE REQUIREMENTS

The EtO gas-sterilization system at Sterigenics U.S., LLC. was tested to determine compliance with the current federal EPA National Emissions Standard for Hazardous Air Pollutants (NESHAP) for ethylene oxide, and with the requirements specified in the MCDEP Permit. The current testing was performed to demonstrate continued compliance with the following requirements:

- The emissions from the sterilization chamber exhaust vents (backvents) must be discharged to control equipment with an EtO emission-reduction efficiency of at least 99.0% by weight.

- The emissions from the aeration process must be discharged to control equipment with an EtO emission-reduction efficiency of at least 99.0% by weight.

Testing is required to demonstrate compliance with these requirements. Source testing of the emission-control device is required annually, in accordance with the conditions established in the permit granted by the MCDEP.

5.0 TEST METHOD REFERENCE

5.1 INTRODUCTION

EtO source testing was conducted in accordance with the procedures outlined in CARB Method 431, the USEPA approved alternate method to the procedures listed in 40 CFR, Part 63.365, subpart O. EtO concentration measurement for each test run will be conducted simultaneously at the inlet and outlet of the catalytic oxidizer during chamber backvent, and during a one-hour interval of the 24-hour aeration process. A total of three chamber backvent test runs, and three one-hour aeration test runs, were performed.

During backvent and aeration testing, EtO concentration at the inlet and the outlet of the catalytic oxidizer were determined using direct source sample injection into the gas chromatograph (GC). All backvent and aeration testing was performed using freshly sterilized product.

Operation and documentation of process conditions were performed by personnel from Sterigenics using existing monitoring instruments installed by the manufacturer on the equipment to be tested. In accordance with USEPA CFR40, Part 63.364 (c), catalyst bed temperature was recorded, using the lone thermocouple installed by the equipment manufacturer to display the average/representative temperature immediately downstream of the bank of catalyst trays.

5.2 CONTROL EFFICIENCY MEASUREMENT

During backvent and aeration testing, EtO concentration at the inlet and outlet of the catalytic oxidizer were determined using direct source sample injection into the GC. Since the source gas flow is identical at the inlet and outlet of the catalytic oxidizer control-efficiency of EtO during aeration and backvent was calculated by comparing the concentration of EtO vented to the system inlet to the concentration of EtO vented from the system outlet.

CARB Method 431, Appendix A, specifies that catalytic oxidizer emission-control devices may be tested, and control efficiency determined, without volumetric flow measurement as long as the following criteria are met:

1) There is no dilution between the inlet and outlet sampling locations

2) There is identical flow at the inlet and outlet sampling locations, and
3) There is constant flow throughout the duration of the compliance test.

These conditions were all met during the testing performed at Sterigenics. Specifically, condition 2 was met due to the extremely high flow rate of ambient air being drawn through the oxidizer (10,000 CFM) which, when compared to the relatively low flow rate of natural gas to the heater burner, renders the potential contribution of any fuel gas combustion products to the outlet flow rate to be extremely negligible. In addition, emissions testing for combustion products performed on similar gas-fired catalytic oxidizers used to control EtO emissions has demonstrated that the exhaust gas composition at the outlet of the oxidizer contains moisture, oxygen, carbon dioxide, and carbon monoxide at ambient levels, and that any deviations are at low ppmv levels. This is further proof that the potential contribution of any fuel gas combustion products to the outlet flow rate is insignificant.

During the backvent and aeration phases, vented gas was analyzed by an SRI, Model 8610, portable gas chromatograph (GC), equipped with the following: dual, heated sample loops and injectors; dual columns; and dual detectors. A flame ionization detector (FID) was used to quantify inlet EtO concentration, and a photoionization detector (PID) was used to quantify low-level EtO concentration at the emission-control device outlet.

5.3 SAMPLE TRANSPORT

Source gas was pumped to the GC at approximately 1000 cubic centimeters per minute (cc/min) from the sampling ports through two lengths of Teflon® sample line, each with a nominal volume of approximately 75 cubic centimeters (cc) and an outer diameter of 0.25 inch. At the inlet, the sampling port was located in the common backvent/aeration discharge duct, upstream of the oxidizer. At the outlet of the catalytic oxidizer, sampling ports were located in the exhaust stack downstream of the catalyst bed.

5.4 GC INJECTION

Source-gas samples were then injected into the GC which was equipped with two heated sampling loops, each containing a volume of approximately 2cc and maintained at 100 degrees Celsius (C). Injections occurred at approximately five-minute intervals during the aeration-phase testing. Helium was the carrier gas for both the FID and PID.

5.5 GC CONDITIONS

The packed columns for the GC were both operated at 90 degrees C. The columns were stainless steel, 6 feet long, 0.125-inch outer diameter, packed with 1 percent SP-1000 on 60/80 mesh Carbopack B. During the analysis, the FID was operated at 250 degrees C. The support gases for the FID were helium (99.999% pure), hydrogen (99.995% pure) and air (99.9999% pure). Any unused sample gas was vented from the GC system back to the inlet of the control device being tested.

5.6 CALIBRATION STANDARDS

The FID was calibrated for mid-range part-per-million-by-volume (ppmv) level analysis using gas proportions similar to the following:

1) 1,000 ppmv EtO, balance nitrogen
2) 100 ppmv EtO, balance nitrogen
3) 50 ppmv EtO, balance nitrogen (audit gas)
4) 10 ppmv EtO, balance nitrogen
5) 1 ppmv EtO, balance nitrogen

The PID was calibrated for low-range ppmv level analyses using gas proportions similar to the following:

1) 100 ppmv EtO, balance nitrogen
2) 50 ppmv EtO, balance nitrogen (audit gas)
3) 10 ppmv EtO, balance nitrogen
4) 1 ppmv EtO, balance nitrogen

Each of these calibration standards was in a separate, certified manufacturer's cylinder. Copies of the calibration gas laboratory certificates are attached as Appendix I.

5.7 SAMPLING DURATION

Backvent testing was performed in conjunction with normal production operations, during the chamber exhaust venting which is conducted for each sterilization chamber upon conclusion of the sterilization cycle,

immediately prior to and during chamber unloading. Backvent sampling duration was 15 minutes for each of the three test runs.

Since aeration is a 24-hour process at this facility, with constant discharge flow from the aeration chambers to the emission-control system, aeration testing consisted of three 1-hour test runs. Each test run was performed with freshly sterilized product in the aeration chambers.

5.8 CONTROL-EFFICIENCY CALCULATIONS

Control efficiency of EtO was calculated for aeration and backvent, using the following CARB-approved equation:

Efficiency = $(C_i - C_o / C_i)(100)$

Which is a mathematical simplification of the following equation from CARB Method 431, with the identical inlet/outlet flow value removed:

Efficiency = $(W_i - W_o / W_i)(100)$

Where:

W_i = Mass flow rate to the control device inlet, pounds, calculated as $(C_i)(F_i)$

Where:

C_i = EtO concentration at the control device inlet

F_i = Flow rate at the control device inlet

W_o = Mass flow rate from the control device outlet, pounds, calculated as $(C_o)(F_o)$

Where:

C_o = EtO concentration at the control device outlet

F_o = Flow rate at the control device outlet

Results of the control-efficiency testing are presented in Section 8.0, and in Tables 1 and 2.

6.0 TEST SCENARIO

The backvent and aeration testing was performed during normal process load conditions. Three backvent and three aeration test runs were conducted in series to verify the performance of the emission-control device. The testing schedule was as follows:

1) Testing equipment was set up and calibrated.
2) Backvent Phase Test Run #1 was conducted with one freshly sterilized production load. Sampling was performed at the inlet and the outlet of the catalytic oxidizer.
3) Aeration Phase Test Run #1 was conducted with freshly sterilized product in aeration. Sampling was performed at the inlet and the outlet of the catalytic oxidizer.
4) Backvent Phase Test Run #2 was conducted with one freshly sterilized production load. Sampling was performed at the inlet and the outlet of the catalytic oxidizer.
5) Aeration Phase Test Run #2 was conducted with freshly sterilized product in aeration. Sampling was performed at the inlet and the outlet of the catalytic oxidizer.
6) Backvent Phase Test Run #3 was conducted with one freshly sterilized production load. Sampling was performed at the inlet and the outlet of the catalytic oxidizer.
7) Aeration Phase Test Run #3 was conducted with freshly sterilized product in aeration. Sampling was performed at the inlet and the outlet of the catalytic oxidizer.
8) Post calibration check was performed, testing equipment was packed.

7.0 QA/QC

7.1 FIELD TESTING QUALITY ASSURANCE

At the beginning of the test, the sampling system was leak checked at a vacuum of 15 inches of mercury. The sampling system was considered leak free when the flow indicated by the rotameters fell to zero.

At the beginning of the test, a system blank was analyzed to ensure that the sampling system was free of EtO. Ambient air was introduced at the end of the sample line and drawn through the sampling system line to the GC for analysis. The resulting chromatogram also provided a background level for non-EtO components (i.e. ambient air, carbon dioxide, water vapor) which are present in the source gas stream due to the ambient dilution air which is drawn into the emission-control device, and due to the destruction of EtO by the emission-control device which produces carbon dioxide and water vapor. This chromatogram, designated AMB, is included with the calibration data in Appendix A.

7.2 CALIBRATION PROCEDURES

The GC system was calibrated at the beginning and conclusion of each day's testing. Using the Peaksimple II analytical software, a calibration curve was constructed for each detector. A gas cylinder of similar composition as the calibration gases, but certified by a separate supplier, was used to verify calibration gas composition and GC performance.

All calibration gases and support gases used were of the highest purity and quality available. A copy of the laboratory certification for each calibration gas is attached as Appendix I.

8.0 TEST RESULTS

The catalytic oxidizer was found to have an average EtO control efficiency of 99.97 percent for backvent, and an average EtO control efficiency of 99.96 percent for aeration. In accordance with state and federal requirements, backvent and aeration discharge streams must be vented to control equipment with an EtO emission-reduction efficiency of at least 99 percent by weight. The catalytic oxidizer met this requirement.

The test results are summarized in Tables 1 and 2. These tables include results for EtO control efficiency of the emission-control device. Chromatograms and chromatographic supporting data are attached as Appendices A through G. Copies of field data and calculation worksheets are attached as Appendix H.

TABLES

TABLE 1
ETHYLENE OXIDE CONTROL EFFICIENCY - BACKVENT
OF AN ETHYLENE OXIDE EMISSION CONTROL DEVICE
OPERATED BY STERIGENICS U.S., LLC.
IN CHARLOTTE, NORTH CAROLINA
ON DECEMBER 9, 2019

RUN NUMBER	INJECTION TIME	INLET ETO CONC. (PPM)(1)	OUTLET ETO CONC. (PPM)(2)	ETO CONTROL EFFICIENCY
1(3)	1044	61.2	0.021	99.97
1	1046	103	0.021	99.98
1	1047	85.3	0.021	99.98
1	1049	82.0	0.021	99.97
1	1050	80.0	0.021	99.97
1	1051	80.8	0.021	99.97
1	1052	80.0	0.021	99.97
1	1053	79.8	0.021	99.97
1	1054	79.1	0.021	99.97
1	1056	81.9	0.021	99.97
1	1057	72.7	0.021	99.97
1	1058	71.5	0.021	99.97
2(4)	1255	61.7	0.021	99.97
2	1256	61.0	0.021	99.97
2	1257	61.5	0.021	99.97
2	1259	60.3	0.021	99.97
2	1300	60.6	0.021	99.97
2	1301	60.8	0.021	99.97
2	1302	60.3	0.021	99.97
2	1303	59.4	0.021	99.96
2	1305	61.0	0.021	99.97
2	1306	60.1	0.021	99.97
2	1307	59.0	0.021	99.96
2	1308	59.2	0.021	99.96
3(5)	1419	57.6	0.021	99.96
3	1420	176	0.021	99.99
3	1421	119	0.021	99.98
3	1422	95.0	0.021	99.98
3	1424	91.4	0.021	99.98
3	1425	90.9	0.021	99.98
3	1426	64.4	0.021	99.97
3	1427	58.6	0.021	99.96
3	1428	58.7	0.021	99.96
3	1430	56.8	0.021	99.96
3	1431	56.4	0.021	99.96
3	1433	56.5	0.021	99.96
TIME-WEIGHTED AVERAGE:		**73.99**	**0.0210**	**99.97**
		MCDEP REQUIRED CONTROL EFFICIENCY:		**99%**

Notes:
(1) - PPM = parts per million by volume
(2) - 0.021 ppm is the quantification limit for the detector used at the outlet.
(3) - Backvent Phase Test Run #1 started at 10:43, ended at 10:58 (catalyst bed temp @ 302 degF)
(4) - Backvent Phase Test Run #2 started at 12:54, ended at 13:08 (catalyst bed temp @ 302 degF)
(5) - Backvent Phase Test Run #3 started at 14:18, ended at 14:33 (catalyst bed temp @ 302 degF)

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TABLE 2
ETHYLENE OXIDE CONTROL EFFICIENCY - AERATION
OF AN ETHYLENE OXIDE EMISSION CONTROL DEVICE
OPERATED BY STERIGENICS U.S., LLC.
IN CHARLOTTE, NORTH CAROLINA
ON DECEMBER 9, 2019

RUN NUMBER	INJECTION TIME	INLET ETO CONC. (PPM)(1)	OUTLET ETO CONC. (PPM)(2)	ETO CONTROL EFFICIENCY
1(3)	1101	70.3	0.021	99.97
1	1106	64.9	0.021	99.97
1	1111	60.4	0.021	99.97
1	1116	59.1	0.021	99.96
1	1121	58.7	0.021	99.96
1	1126	58.7	0.021	99.96
1	1131	56.8	0.021	99.96
1	1136	56.4	0.021	99.96
1	1141	57.3	0.021	99.96
1	1146	59.5	0.021	99.96
1	1151	59.0	0.021	99.96
1	1156	59.2	0.021	99.96
2(4)	1311	57.5	0.021	99.96
2	1316	59.9	0.021	99.96
2	1321	59.1	0.021	99.96
2	1326	59.6	0.021	99.96
2	1331	59.0	0.021	99.96
2	1336	59.5	0.021	99.96
2	1341	59.0	0.021	99.96
2	1346	58.3	0.021	99.96
2	1351	57.8	0.021	99.96
2	1356	58.3	0.021	99.96
2	1401	58.1	0.021	99.96
2	1406	59.1	0.021	99.96
3(5)	1436	57.0	0.021	99.96
3	1441	55.4	0.021	99.96
3	1446	55.6	0.021	99.96
3	1451	56.7	0.021	99.96
3	1456	56.1	0.021	99.96
3	1501	55.7	0.021	99.96
3	1506	54.7	0.021	99.96
3	1511	54.5	0.021	99.96
3	1516	54.7	0.021	99.96
3	1521	55.2	0.021	99.96
3	1526	55.6	0.021	99.96
3	1531	54.6	0.021	99.96
TIME-WEIGHTED AVERAGE:		**58.09**	**0.0210**	**99.96**
		MCDEP REQUIRED CONTROL EFFICIENCY:		**99%**

Notes:
(1) - PPM = parts per million by volume
(2) - 0.021 ppm is the quantification limit for the detector used at the outlet.
(3) - Aeration Phase Test Run #1 started at 10:59, ended at 11:59 (catalyst bed temp @ 302 degF)
(4) - Aeration Phase Test Run #2 started at 13:09, ended at 14:09 (catalyst bed temp @ 302 degF)
(5) - Aeration Phase Test Run #3 started at 14:34, ended at 15:34 (catalyst bed temp @ 302 degF)

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APPENDICES

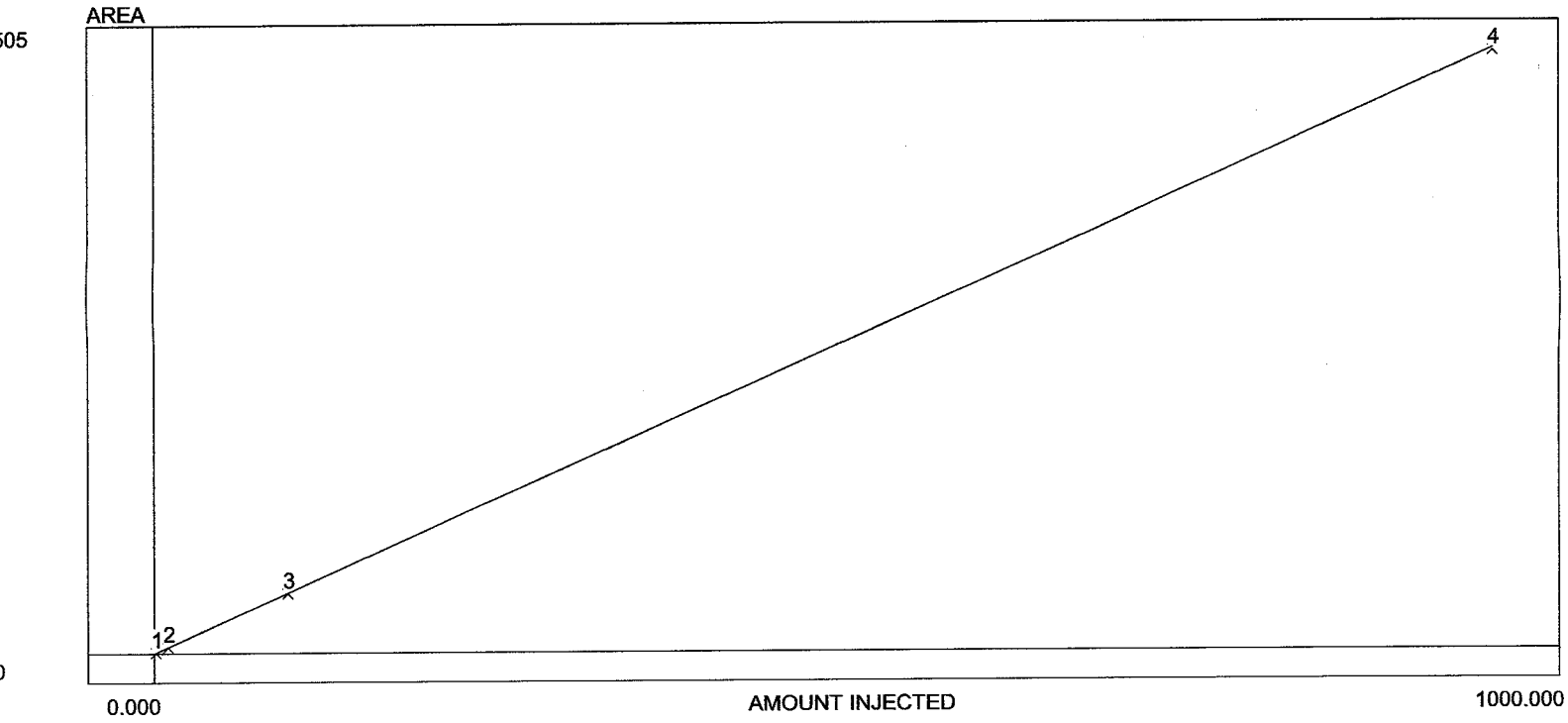
APPENDIX A

Calibration Data

Component file: eto1-100.cpt

Peak	Name	Start	End	Calibration	Int.Std	Units
1	Dead Vol / Air	0.000	0.280		0.000	
2	Ambient H2O	0.280	0.400		0.000	
3	Ethylene Oxide	0.400	0.550	C:\peak454-64bit\0.000\1Sppm-LT2019.CAL		
4	Acetaldehyde	0.550	1.000		0.000	

Calibration file: C:\peak454-64bitWin10\1SterCLT2019.CAL



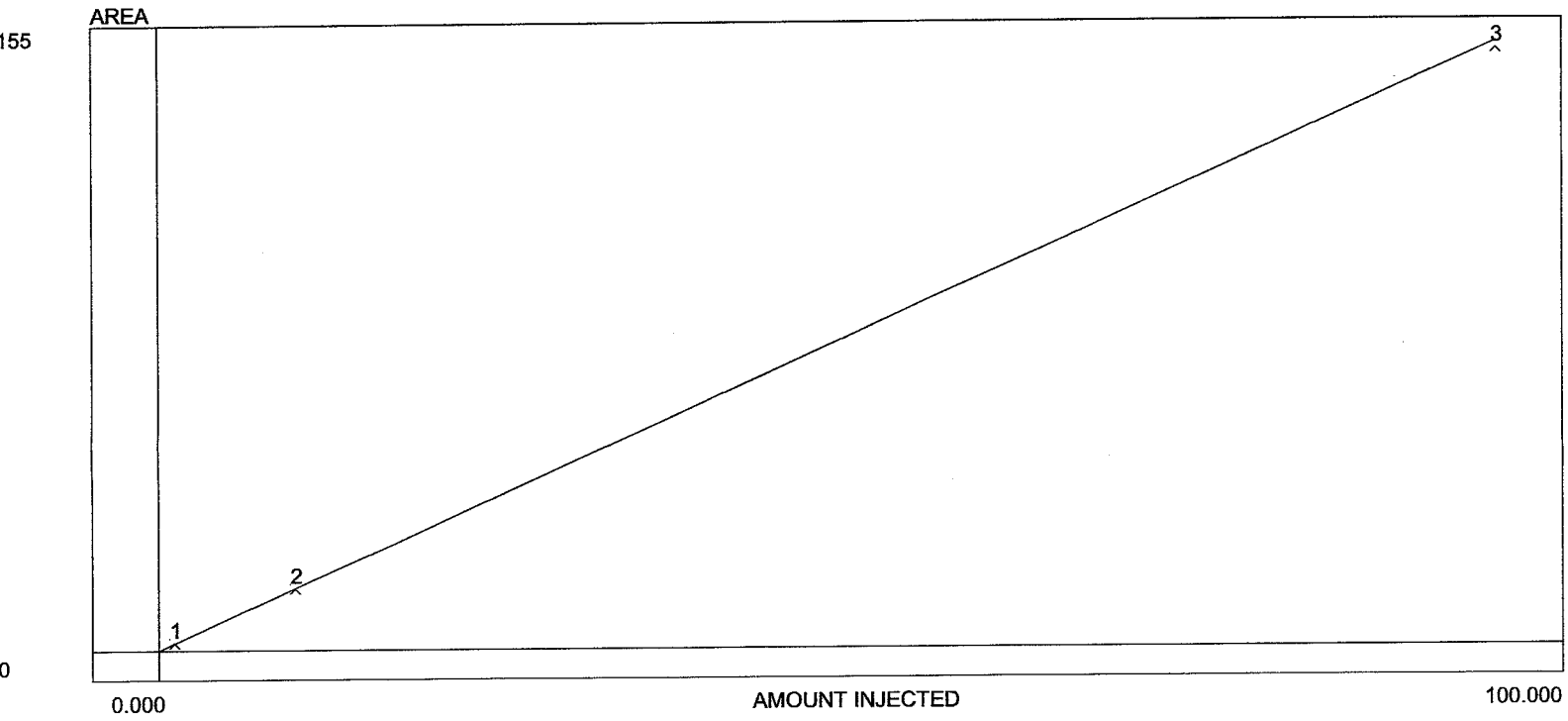
Avg slope of curve: 0.51
Y-axis intercept: 0.00
Linearity: 1.00
Number of levels: 4
SD/rel SD of CF's: 0.0/1.3
Y=0.5073X
R2: 1.0000
Last calibrated: Mon Dec 09 07:27:09 2019

Lvl.	Area/ht.	Amount	CF	Current	Previous #1	Previous #2
1	0.610	1.180	0.517	0.610	N/A	N/A
2	5.117	10.200	0.502	5.117	N/A	N/A
3	50.530	100.000	0.505	50.530	N/A	N/A
4	505.300	1000.000	0.505	505.300	N/A	N/A

Component file: eto2-100.cpt

Peak	Name	Start	End	Calibration	Int.Std	Units
1	Dead Vol / Air	0.000	0.280		0.000	
2	Ambient H2O	0.280	0.400		0.000	
3	Ethylene Oxide	0.400	0.550	C:\peak454-64bit\0.000\2Sppm.LT2019.CAL		
4	Acetaldehyde	0.550	1.000		0.000	

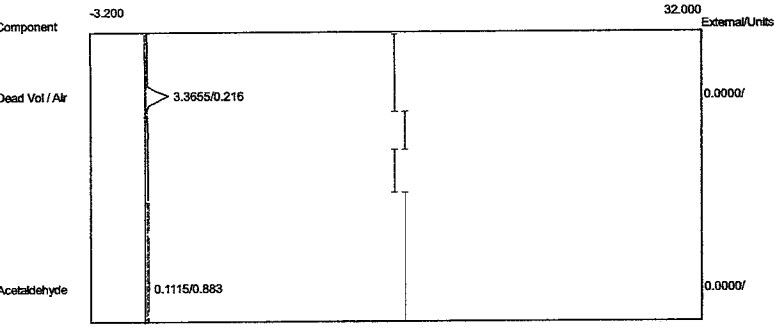
Calibration file: C:\peak454-64bitWin10\2SterCLT2019.CAL



Avg slope of curve: 1.57
Y-axis intercept: 0.00
Linearity: 1.00
Number of levels: 3
SD/rel SD of CF's: 0.0/1.6
Y=1.5713X
r2: 1.0000
Last calibrated: Mon Dec 09 07:03:44 2019

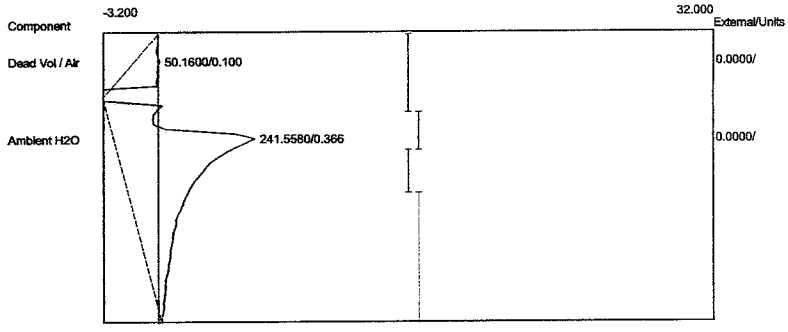
Lvl.	Area/ht.	Amount	CF	Current	Previous #1	Previous #2
1	1.887	1.180	1.599	1.887	N/A	N/A
2	15.930	10.200	1.562	15.930	N/A	N/A
3	155.300	100.000	1.553	155.300	N/A	N/A

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:10:33
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-Amb.CHR (c:\peak359)
Sample: Ambient Background
Operator: D. Kremer



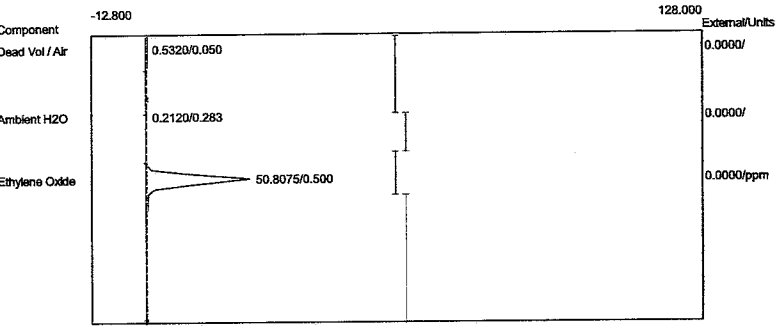
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	3.3655	0.0000	
Acetaldehyde	0.883	0.1115	0.0000	
		3.4770	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:10:33
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-Amb.CHR (c:\peak359)
Sample: Ambient Background
Operator: D. Kremer



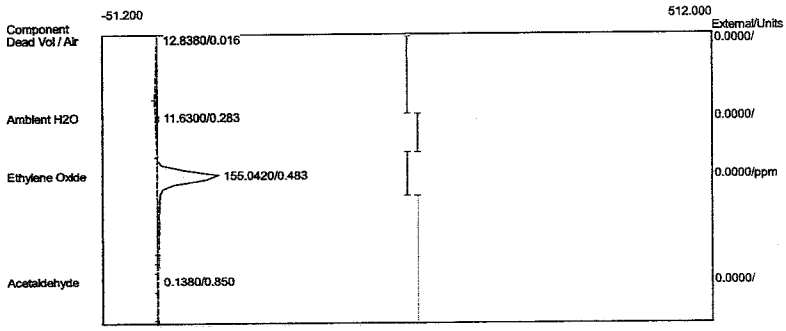
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	50.1600	0.0000	
Ambient H2O	0.366	241.5580	0.0000	
		291.7180	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:17:44
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C01.CHR (c:\peak359)
Sample: ~~Ambient Background~~ 100 ppm std
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.050	0.5320	0.0000	
Ambient H2O	0.283	0.2120	0.0000	
Ethylene Oxide	0.500	50.8075	0.0000	ppm
		51.5515	0.0000	

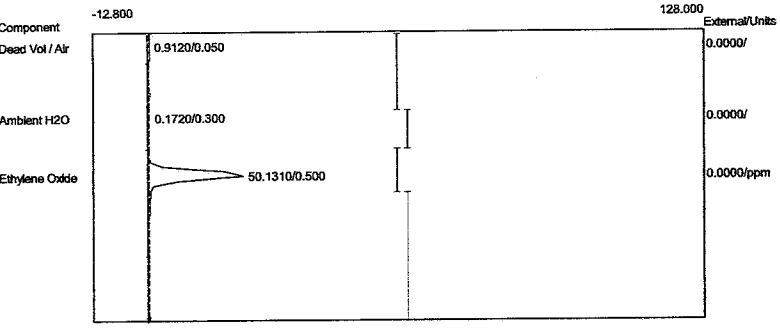
Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:17:44
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C01.CHR (c:\peak359)
Sample: ~~Ambient Background~~ 100 ppm std
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	12.8380	0.0000	
Ambient H2O	0.283	11.6300	0.0000	
Ethylene Oxide	0.483	155.0420	0.0000	ppm
Acetaldehyde	0.850	0.1380	0.0000	
		179.6480	0.0000	

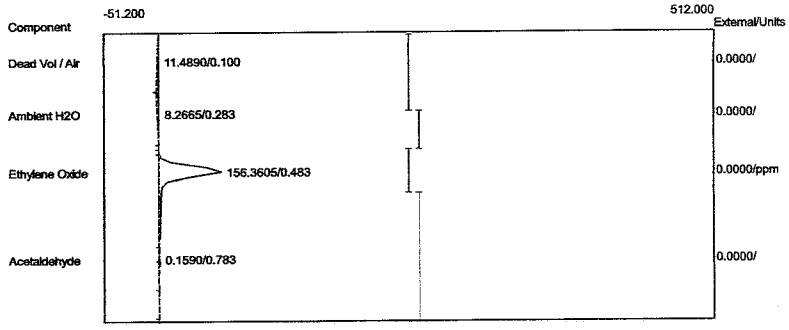
Lab name: ESSI

Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:20:33
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C02.CHR (c:\peak359)
Sample: ~~Ambient Background~~ 100 ppm std
Operator: D. Kremer



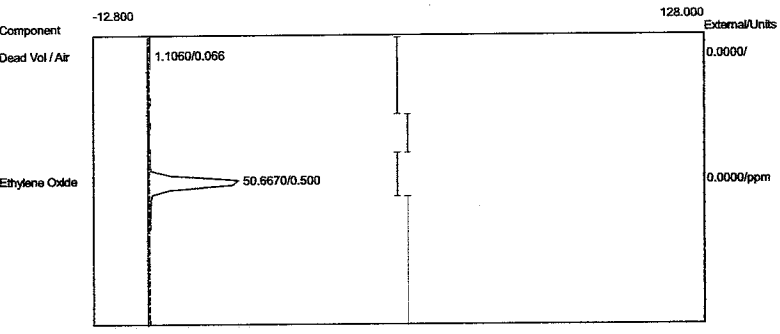
Component	Retention	Area	External	Units
Dead Vol / Air	0.050	0.9120	0.0000	
Ambient H2O	0.300	0.1720	0.0000	
Ethylene Oxide	0.500	50.1310	0.0000	ppm
		51.2150	0.0000	

Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:20:33
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C02.CHR (c:\peak359)
Sample: ~~Ambient Background~~ 100 ppm std
Operator: D. Kremer



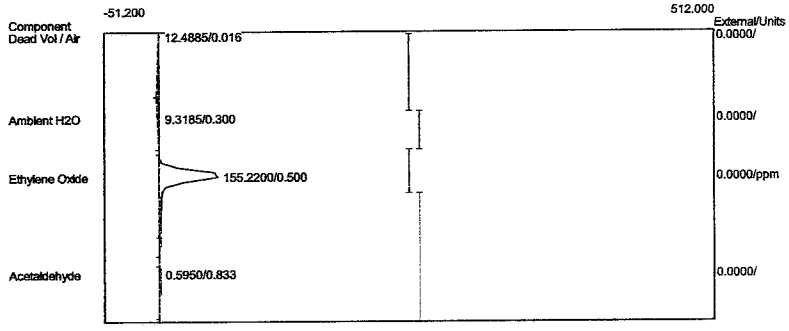
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	11.4890	0.0000	
Ambient H2O	0.283	8.2665	0.0000	
Ethylene Oxide	0.483	156.3605	0.0000	ppm
Acetaldehyde	0.783	0.1590	0.0000	
		176.2750	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:22:51
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C03.CHR (c:\peak359)
Sample: ~~Ambient Background~~ 100ppm std
Operator: D. Kremer



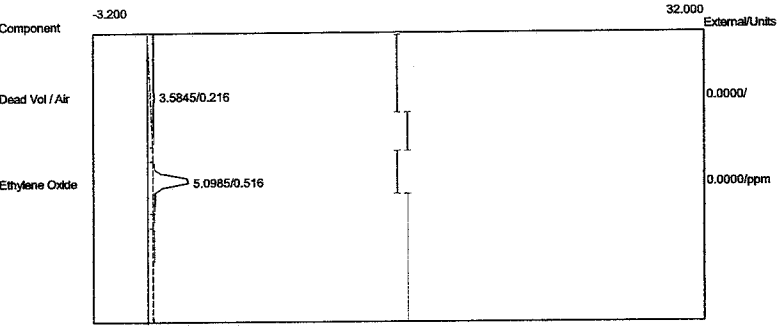
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	1.1060	0.0000	
Ethylene Oxide	0.500	50.6670	0.0000	ppm
		51.7730	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:22:51
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C03.CHR (c:\peak359)
Sample: ~~Ambient Background~~ 100ppm std
Operator: D. Kremer



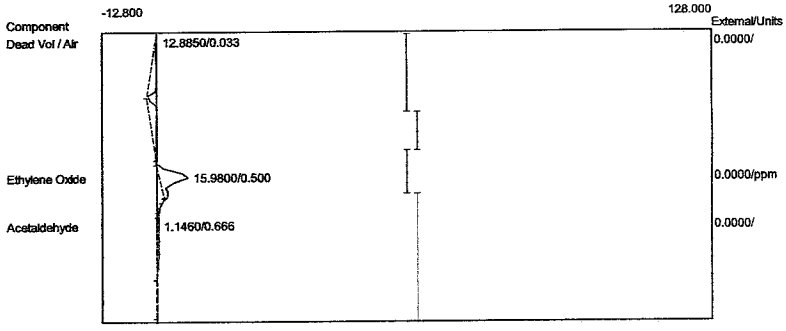
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	12.4885	0.0000	
Ambient H2O	0.300	9.3185	0.0000	
Ethylene Oxide	0.500	155.2200	0.0000	ppm
Acetaldehyde	0.833	0.5950	0.0000	
		177.6220	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:28:50
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C04.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



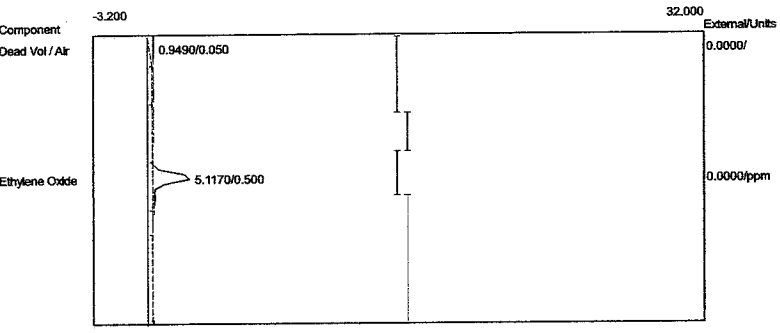
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	3.5845	0.0000	
Ethylene Oxide	0.516	5.0985	0.0000	ppm
		8.6830	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:28:50
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C04.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



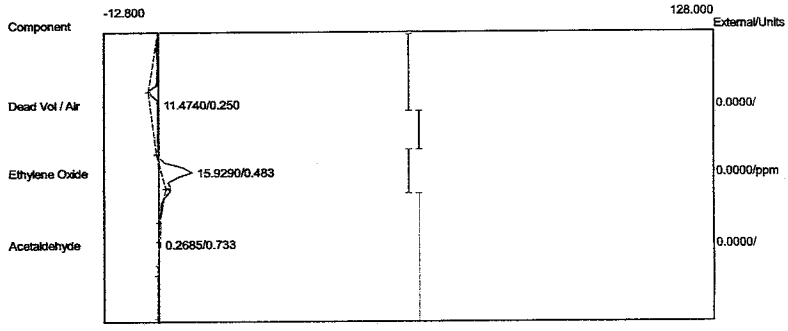
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	12.8850	0.0000	
Ethylene Oxide	0.500	15.9800	0.0000	ppm
Acetaldehyde	0.666	1.1460	0.0000	
		30.0110	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:33:12
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C05.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



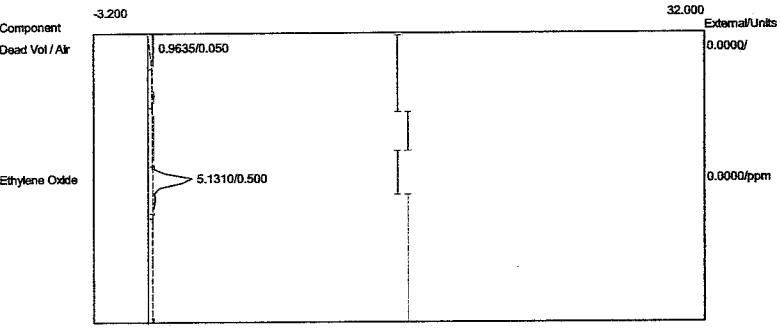
Component	Retention	Area	External	Units
Dead Vol / Air	0.050	0.9490	0.0000	
Ethylene Oxide	0.500	5.1170	0.0000	ppm
		6.0660	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:33:12
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C05.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



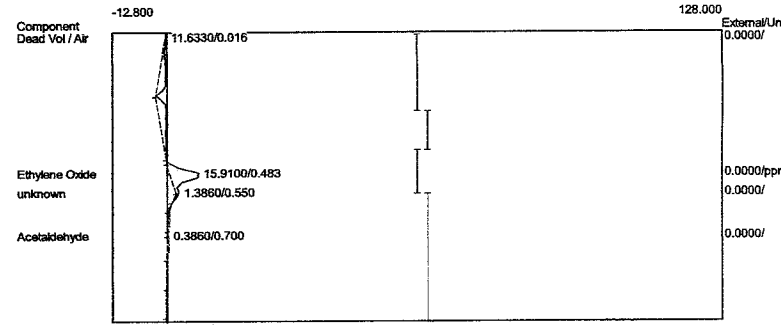
Component	Retention	Area	External	Units
Dead Vol / Air	0.250	11.4740	0.0000	
Ethylene Oxide	0.483	15.9290	0.0000	ppm
Acetaldehyde	0.733	0.2685	0.0000	
		27.6715	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:39:39
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C06.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



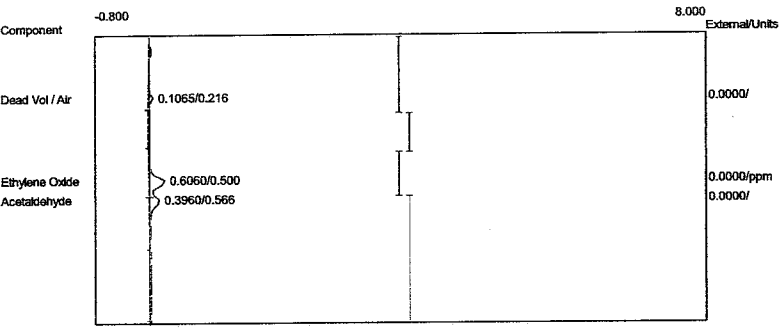
Component	Retention	Area	External	Units
Dead Vol / Air	0.050	0.9635	0.0000	
Ethylene Oxide	0.500	5.1310	0.0000	ppm
		6.0945	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:39:39
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C06.CHR (c:\peak359)
Sample: 10.2 ppm std
Operator: D. Kremer



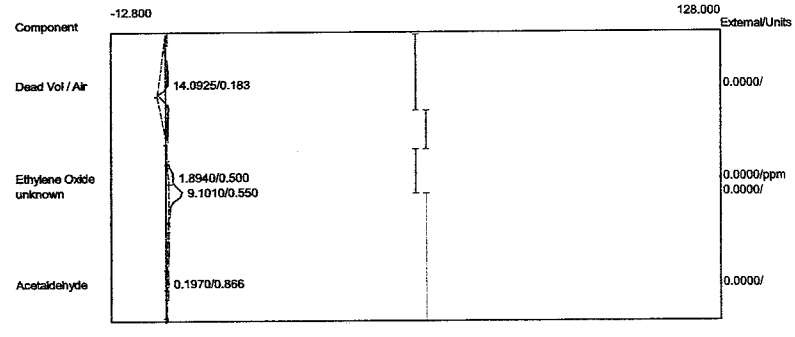
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	11.6330	0.0000	
Ethylene Oxide	0.483	15.9100	0.0000	ppm
Acetaldehyde	0.700	0.3860	0.0000	
		27.9290	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:47:25
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C07.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



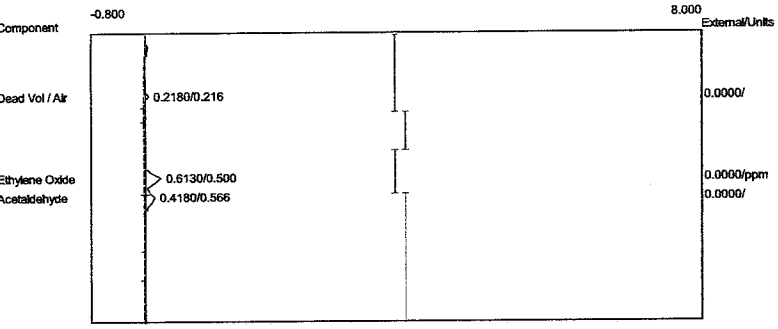
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	0.1065	0.0000	
Ethylene Oxide	0.500	0.6060	0.0000	ppm
Acetaldehyde	0.566	0.3960	0.0000	
		1.1085	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:47:25
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C07.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



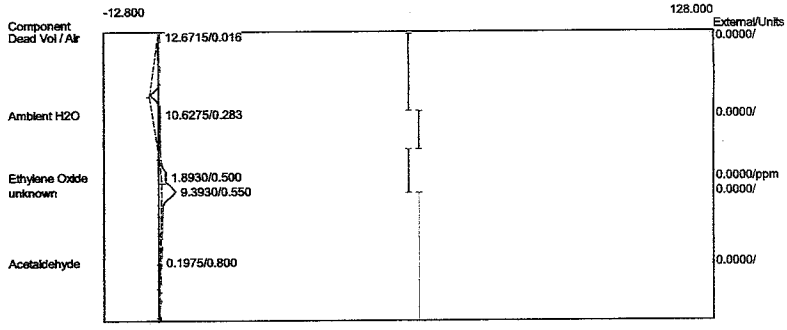
Component	Retention	Area	External	Units
Dead Vol / Air	0.183	14.0925	0.0000	
Ethylene Oxide	0.500	1.8940	0.0000	ppm
Acetaldehyde	0.866	0.1970	0.0000	
		16.1835	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:51:26
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C08.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



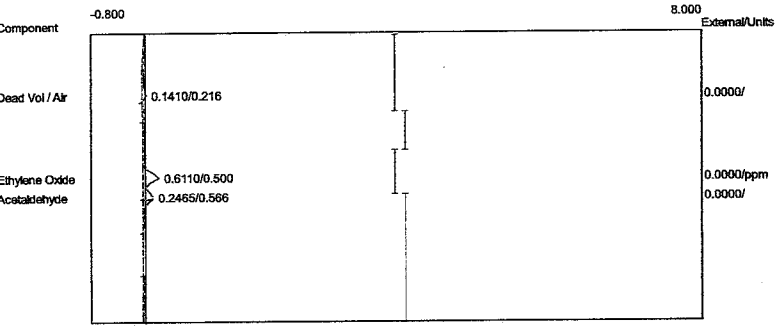
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	0.2180	0.0000	
Ethylene Oxide	0.500	0.6130	0.0000	ppm
Acetaldehyde	0.566	0.4180	0.0000	
		1.2490	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:51:26
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C08.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



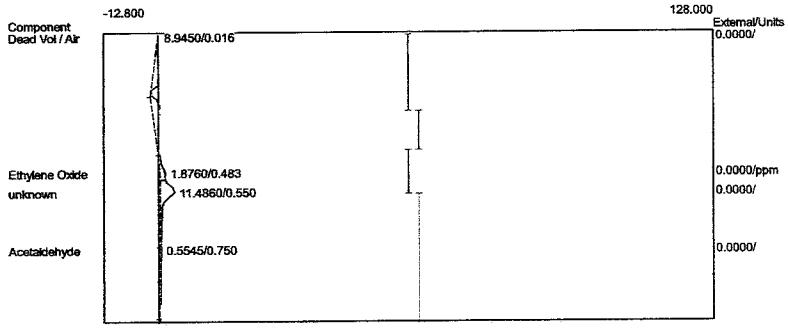
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	12.6715	0.0000	
Ambient H2O	0.283	10.6275	0.0000	
Ethylene Oxide	0.500	1.8930	0.0000	ppm
Acetaldehyde	0.800	0.1975	0.0000	
		25.3895	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:56:19
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C09.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



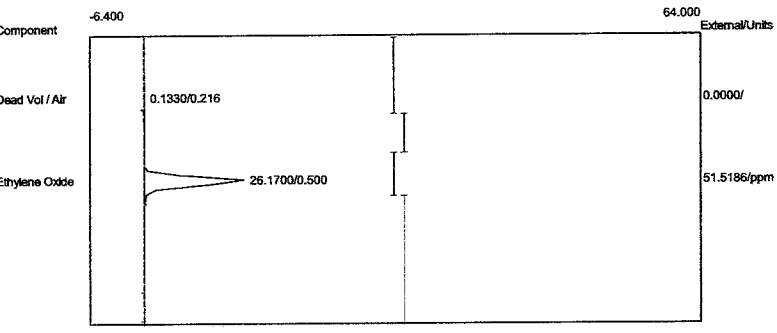
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	0.1410	0.0000	
Ethylene Oxide	0.500	0.6110	0.0000	ppm
Acetaldehyde	0.566	0.2465	0.0000	
		0.9985	0.0000	

Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 06:56:19
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C09.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer



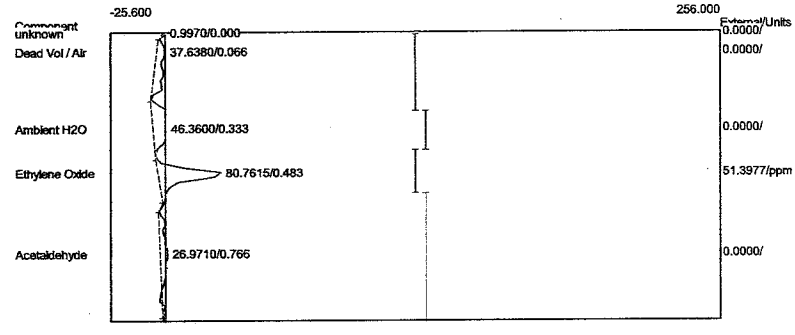
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	8.9450	0.0000	
Ethylene Oxide	0.483	1.8760	0.0000	ppm
Acetaldehyde	0.750	0.5545	0.0000	
		11.3755	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 07:06:26
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C10.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer



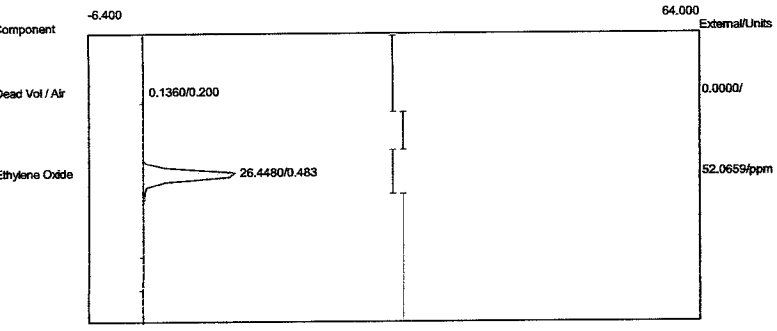
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	0.1330	0.0000	
Ethylene Oxide	0.500	26.1700	51.5186	ppm
		26.3030	51.5186	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 07:06:26
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C10.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer



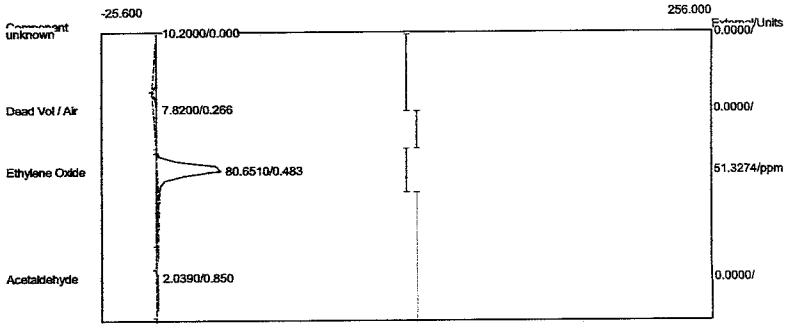
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	37.6380	0.0000	
Ambient H2O	0.333	46.3600	0.0000	
Ethylene Oxide	0.483	80.7615	51.3977	ppm
Acetaldehyde	0.766	26.9710	0.0000	
		191.7305	51.3977	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 07:10:18
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C11.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer
Comments: Sample Line Bias Cal



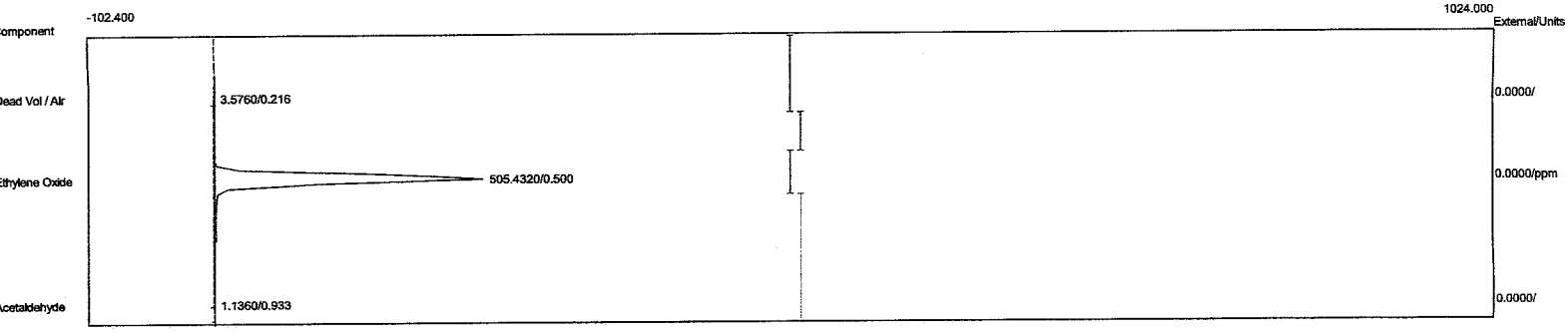
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	0.1360	0.0000	
Ethylene Oxide	0.483	26.4480	52.0659	ppm
		26.5840	52.0659	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 07:10:18
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C11.CHR (c:\peak359)
Sample: 52.0 ppm std
Operator: D. Kremer
Comments: Sample Line Bias Cal



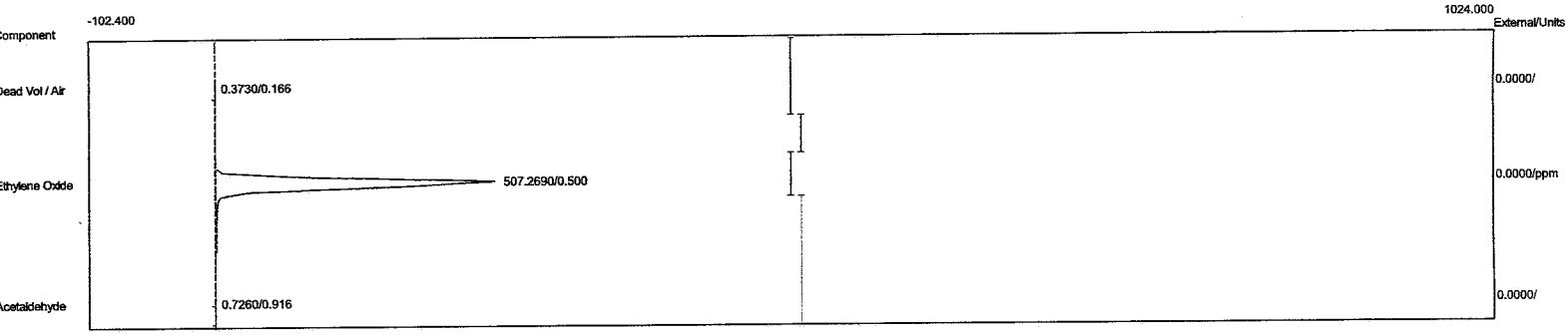
Component	Retention	Area	External	Units
Dead Vol / Air	0.266	7.8200	0.0000	
Ethylene Oxide	0.483	80.6510	51.3274	ppm
Acetaldehyde	0.850	2.0390	0.0000	
		90.5100	51.3274	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 07:16:47
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C12.CHR (c:\peak359)
Sample: 1000 ppm std
Operator: D. Kremer



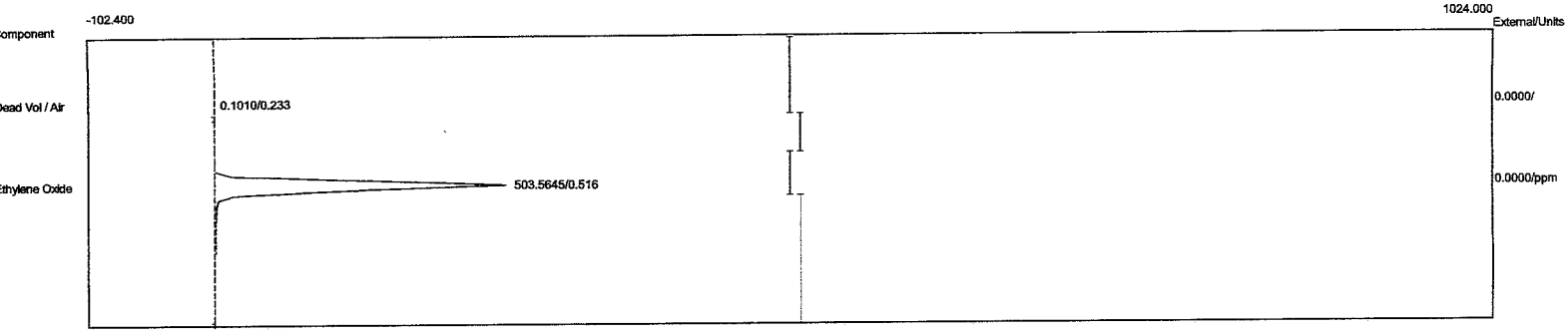
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	3.5760	0.0000	
Ethylene Oxide	0.500	505.4320	0.0000	ppm
Acetaldehyde	0.933	1.1360	0.0000	
		510.1440	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 07:18:54
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C13.CHR (c:\peak359)
Sample: 1000 ppm std
Operator: D. Kremer



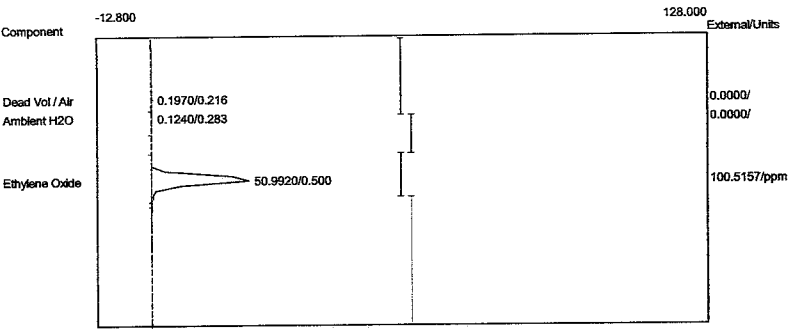
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	0.3730	0.0000	
Ethylene Oxide	0.500	507.2690	0.0000	ppm
Acetaldehyde	0.916	0.7260	0.0000	
		508.3680	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PreCal
Analysis date: 12/09/2019 07:23:11
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C14.CHR (c:\peak359)
Sample: 1000 ppm std
Operator: D. Kremer



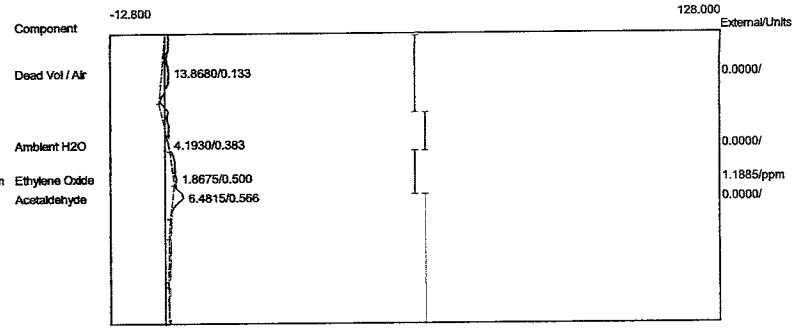
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	0.1010	0.0000	
Ethylene Oxide	0.516	503.5645	0.0000	ppm
		503.6655	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: PostCal
Analysis date: 12/09/2019 12:43:59
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-C15.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	0.1970	0.0000	
Ambient H2O	0.283	0.1240	0.0000	
Ethylene Oxide	0.500	50.9920	100.5157	ppm
		51.3130	100.5157	

Client: Sterigenics - Charlotte
Client ID: PostCal
Analysis date: 12/09/2019 12:38:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-C12.CHR (c:\peak359)
Sample: 1.18 ppm std
Operator: D. Kremer

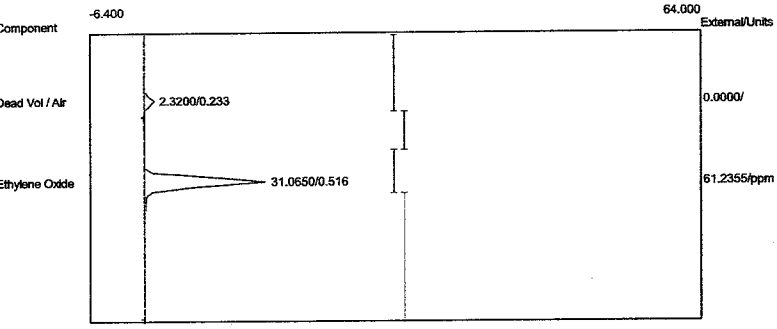


Component	Retention	Area	External	Units
Dead Vol / Air	0.133	13.8680	0.0000	
Ambient H2O	0.383	4.1930	0.0000	
Ethylene Oxide	0.500	1.8675	1.1885	ppm
Acetaldehyde	0.566	6.4815	0.0000	
		26.4100	1.1885	

APPENDIX B

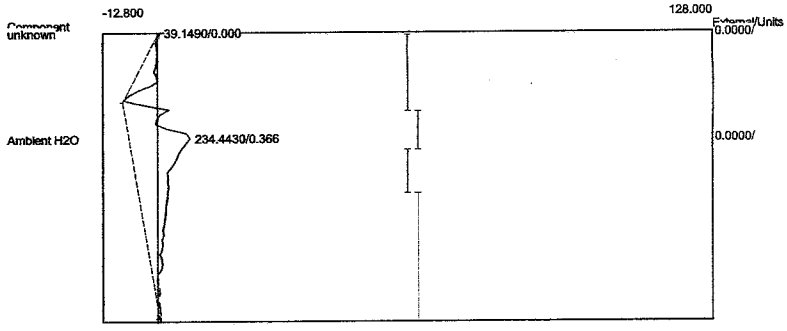
Run #1 Chromatograms – Backvent

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:44:16
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B01.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



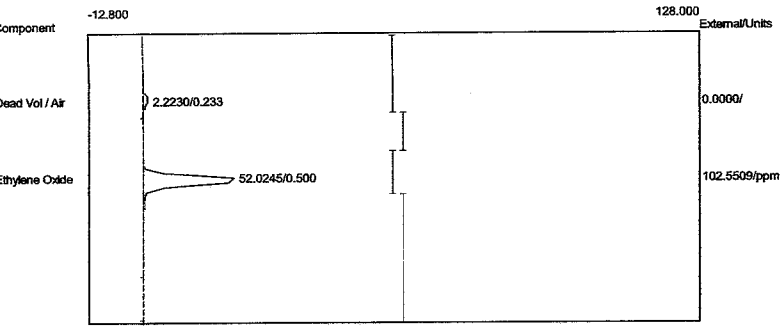
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3200	0.0000	
Ethylene Oxide	0.516	31.0650	61.2355	ppm
		33.3850	61.2355	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:44:16
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B01.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



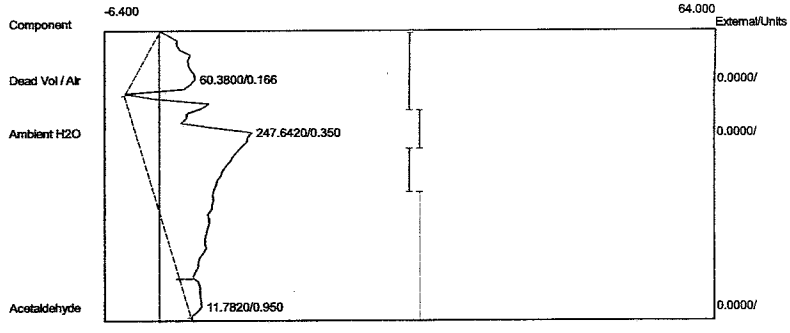
Component	Retention	Area	External	Units
Ambient H2O	0.366	234.4430	0.0000	
		234.4430	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:46:23
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B02.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



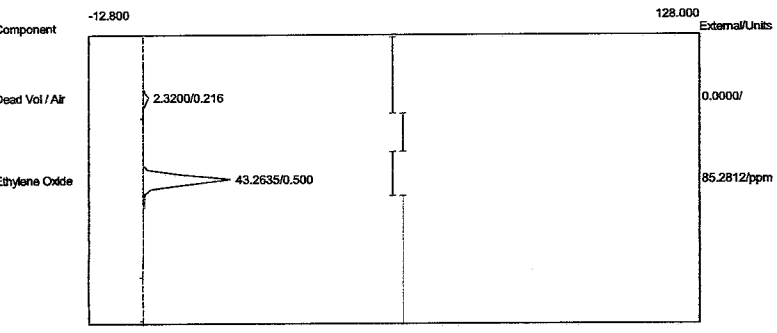
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2230	0.0000	
Ethylene Oxide	0.500	52.0245	102.5509	ppm
		54.2475	102.5509	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:46:23
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B02.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



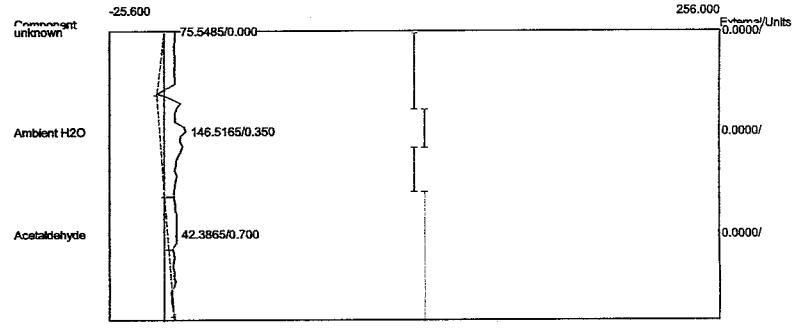
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	60.3800	0.0000	
Ambient H2O	0.350	247.6420	0.0000	
Acetaldehyde	0.950	11.7820	0.0000	
		319.8040	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:47:58
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B03.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



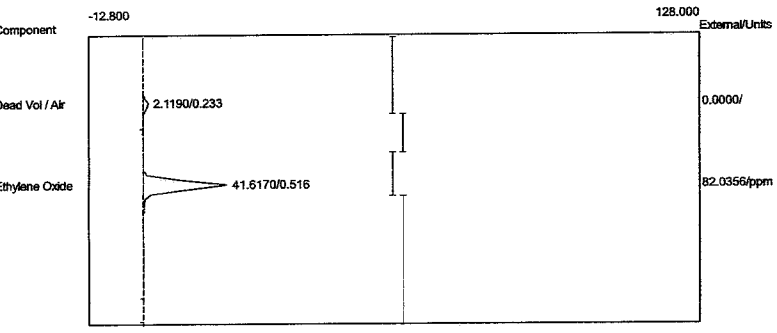
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3200	0.0000	
Ethylene Oxide	0.500	43.2635	85.2812	ppm
		45.5835	85.2812	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:47:58
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B03.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



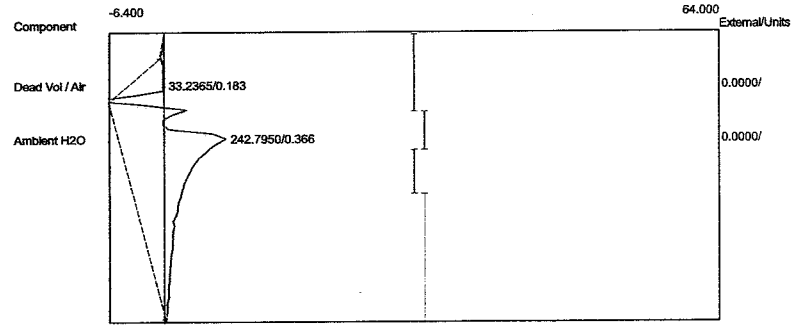
Component	Retention	Area	External	Units
Ambient H2O	0.350	146.5165	0.0000	
Acetaldehyde	0.700	42.3865	0.0000	
		188.9030	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:49:26
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B04.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



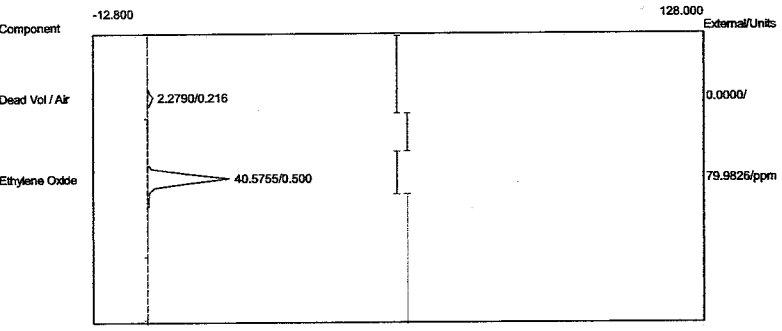
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.1190	0.0000	
Ethylene Oxide	0.516	41.6170	82.0356	ppm
		43.7360	82.0356	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:49:26
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B04.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



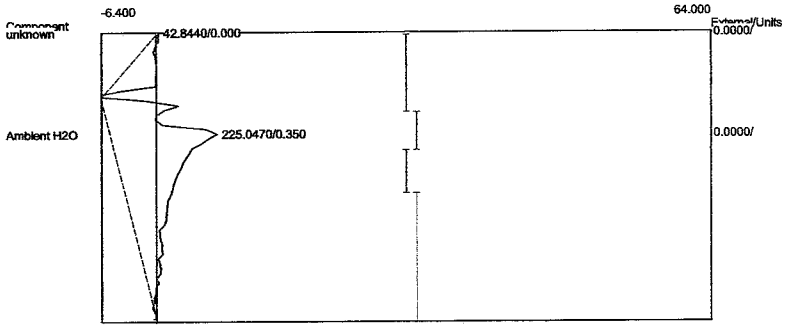
Component	Retention	Area	External	Units
Dead Vol / Air	0.183	33.2365	0.0000	
Ambient H2O	0.366	242.7950	0.0000	
		276.0315	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:50:29
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B05.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



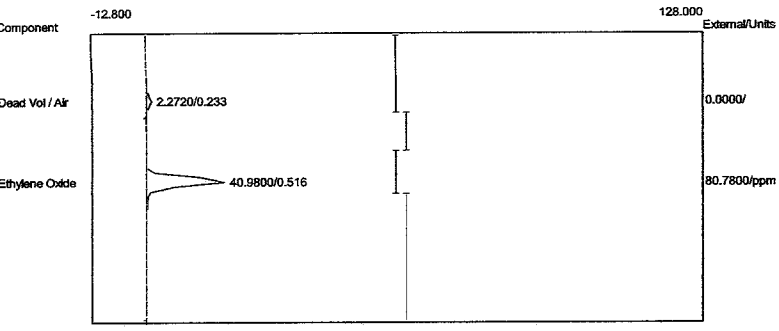
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2790	0.0000	
Ethylene Oxide	0.500	40.5755	79.9826	ppm
		42.8545	79.9826	

Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:50:29
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B05.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



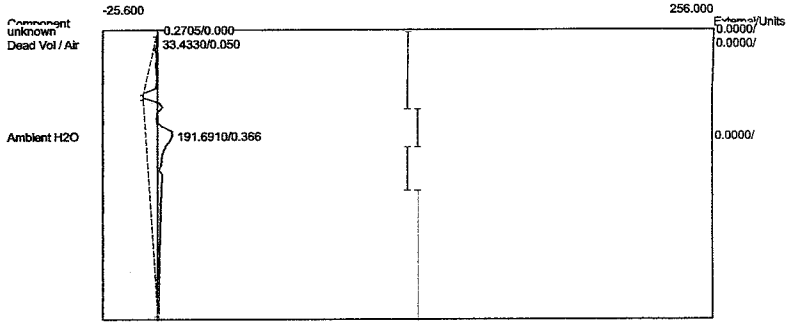
Component	Retention	Area	External	Units
Ambient H2O	0.350	225.0470	0.0000	
		225.0470	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:51:35
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B06.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



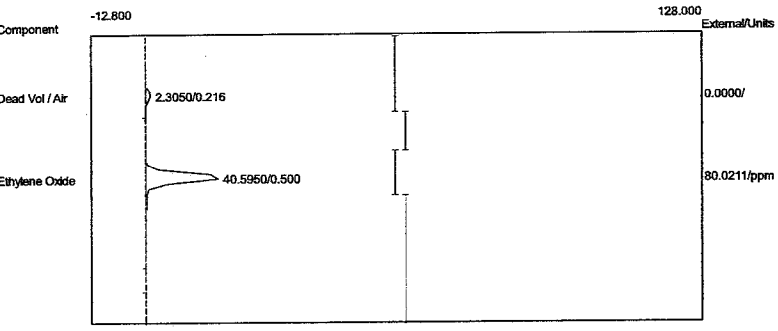
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2720	0.0000	
Ethylene Oxide	0.516	40.9800	80.7800	ppm
		43.2520	80.7800	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:51:35
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B06.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



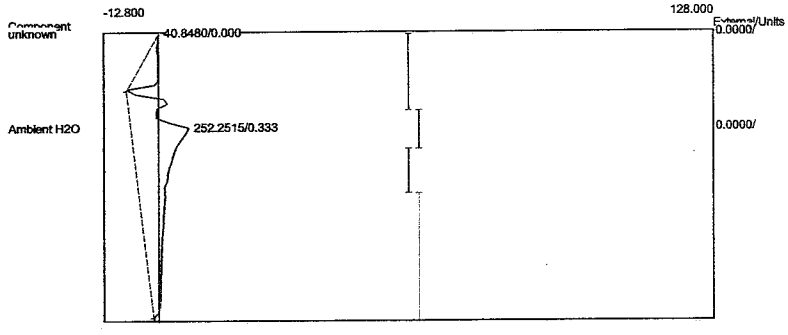
Component	Retention	Area	External	Units
Dead Vol / Air	0.050	33.4330	0.0000	
Ambient H2O	0.366	191.6910	0.0000	
		225.1240	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:52:42
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B07.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



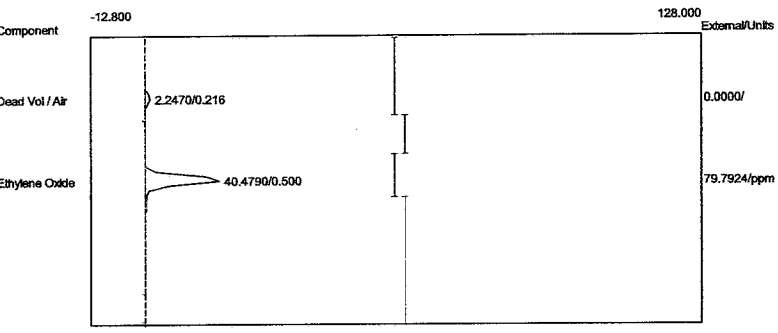
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3050	0.0000	
Ethylene Oxide	0.500	40.5950	80.0211	ppm
		42.9000	80.0211	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:52:42
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B07.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



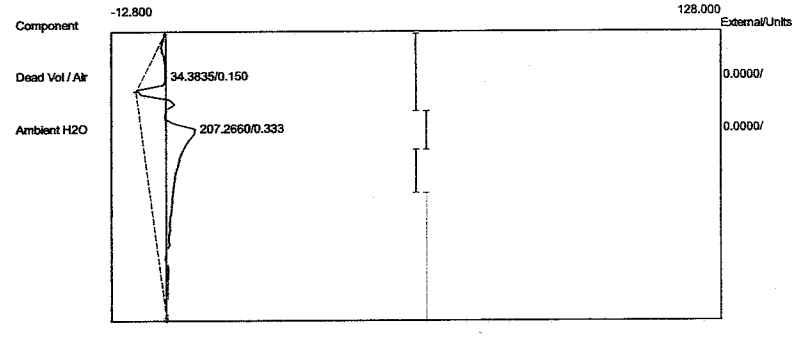
Component	Retention	Area	External	Units
Ambient H2O	0.333	252.2515	0.0000	
		252.2515	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:53:48
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B08.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



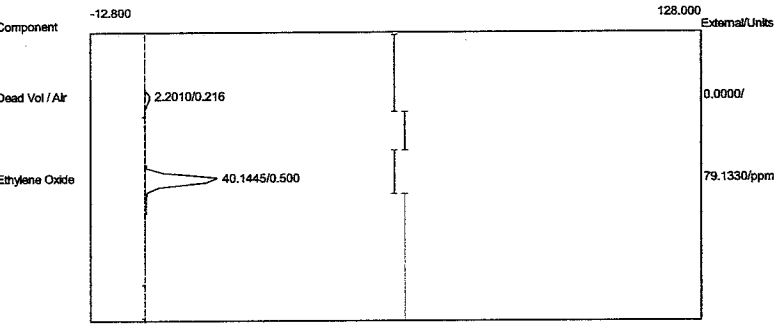
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2470	0.0000	
Ethylene Oxide	0.500	40.4790	79.7924	ppm
		42.7260	79.7924	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:53:48
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B08.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



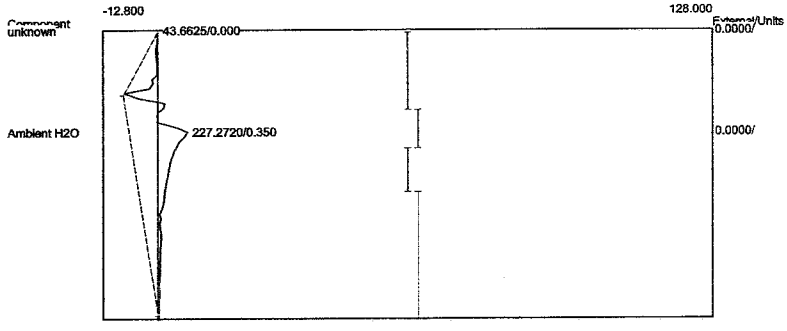
Component	Retention	Area	External	Units
Dead Vol / Air	0.150	34.3835	0.0000	
Ambient H2O	0.333	207.2660	0.0000	
		241.6495	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:54:55
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B09.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



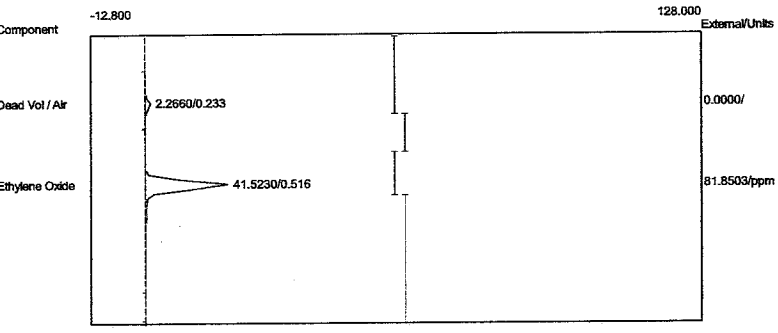
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2010	0.0000	
Ethylene Oxide	0.500	40.1445	79.1330	ppm
		42.3455	79.1330	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:54:55
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B09.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



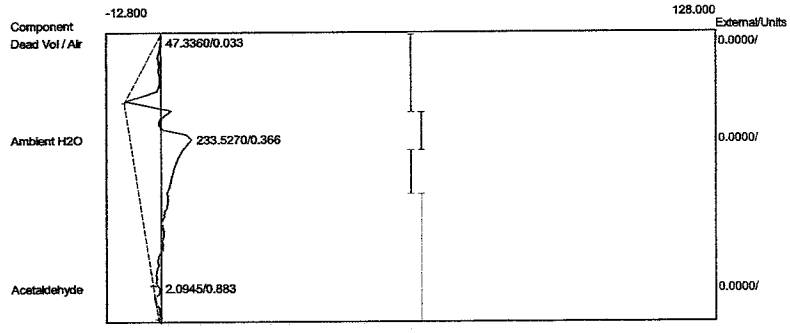
Component	Retention	Area	External	Units
Ambient H2O	0.350	227.2720	0.0000	
		227.2720	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:56:01
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B10.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



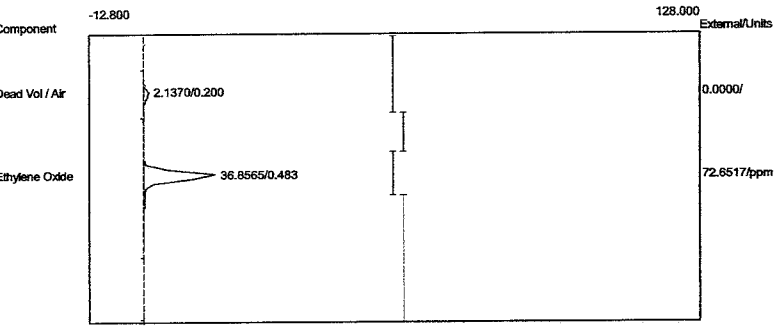
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2660	0.0000	
Ethylene Oxide	0.516	41.5230	81.8503	ppm
		43.7890	81.8503	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:56:01
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B10.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



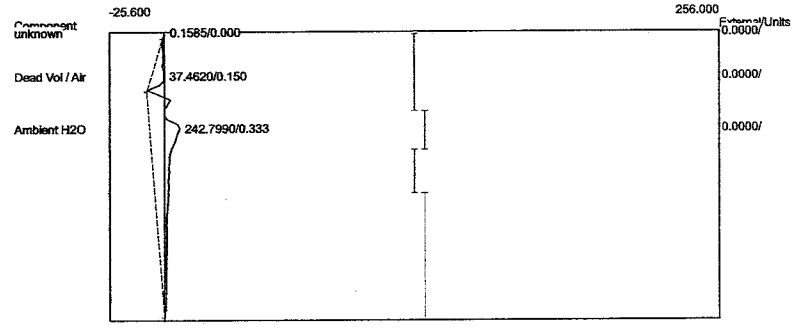
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	47.3360	0.0000	
Ambient H2O	0.366	233.5270	0.0000	
Acetaldehyde	0.883	2.0945	0.0000	
		282.9575	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:57:11
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B11.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



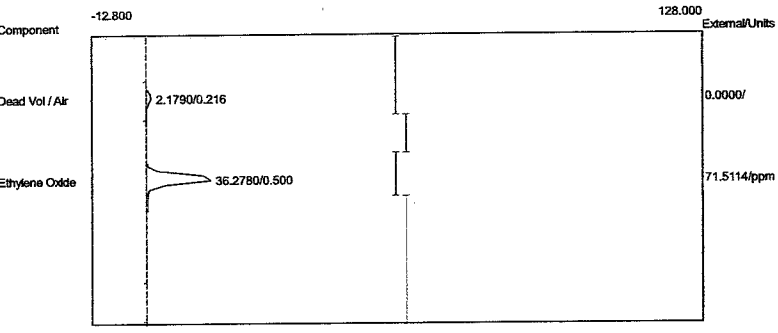
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	2.1370	0.0000	
Ethylene Oxide	0.483	36.8565	72.6517	ppm
		38.9935	72.6517	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:57:11
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B11.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



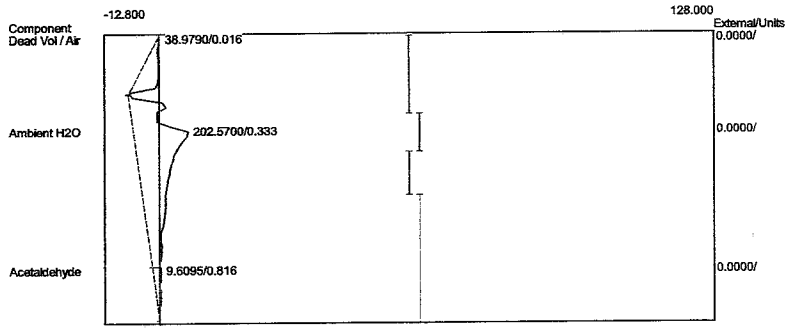
Component	Retention	Area	External	Units
Dead Vol / Air	0.150	37.4620	0.0000	
Ambient H2O	0.333	242.7990	0.0000	
		280.2610	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:58:18
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1B12.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1790	0.0000	
Ethylene Oxide	0.500	36.2780	71.5114	ppm
		38.4570	71.5114	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1BV
Analysis date: 12/09/2019 07:58:18
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1B12.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer

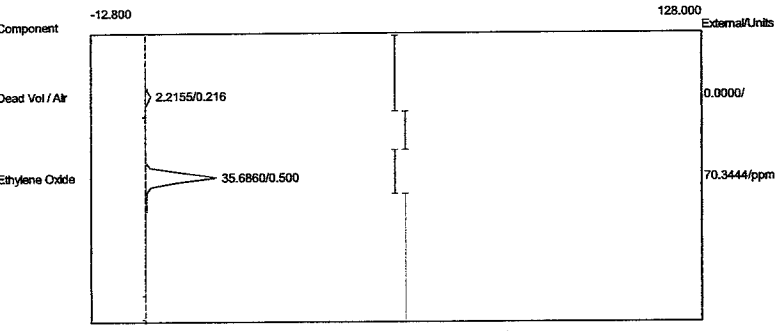


Component	Retention	Area	External	Units
Dead Vol / Air	0.016	38.9790	0.0000	
Ambient H2O	0.333	202.5700	0.0000	
Acetaldehyde	0.816	9.6095	0.0000	
		251.1585	0.0000	

APPENDIX C

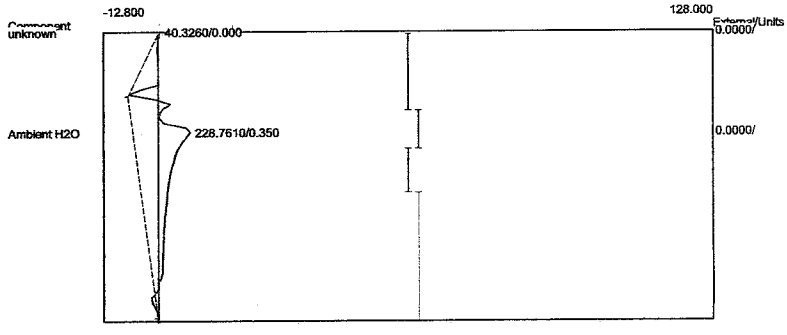
Run #1 Chromatograms – Aeration

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:01:13
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A01.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



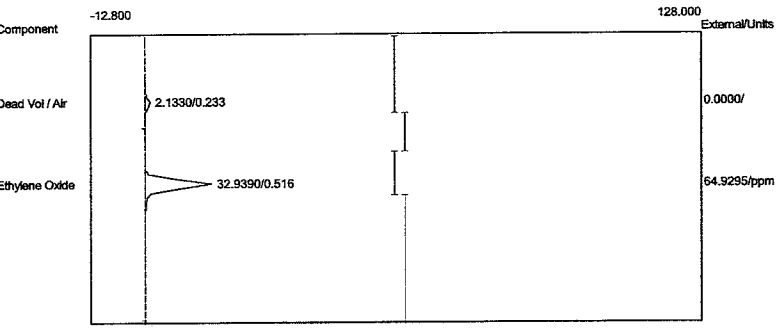
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2155	0.0000	
Ethylene Oxide	0.500	35.6860	70.3444	ppm
		37.9015	70.3444	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:01:13
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A01.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



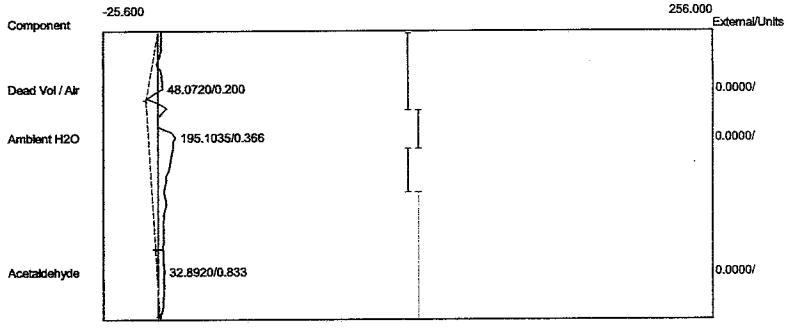
Component	Retention	Area	External	Units
Ambient H2O	0.350	228.7610	0.0000	
		228.7610	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:06:11
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A02.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



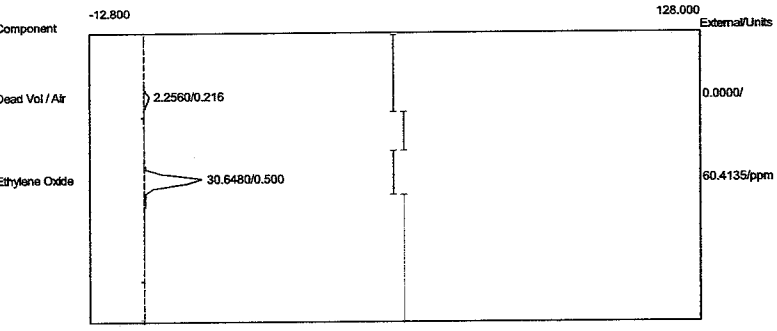
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.1330	0.0000	
Ethylene Oxide	0.516	32.9390	64.9295	ppm
		35.0720	64.9295	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:06:11
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A02.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



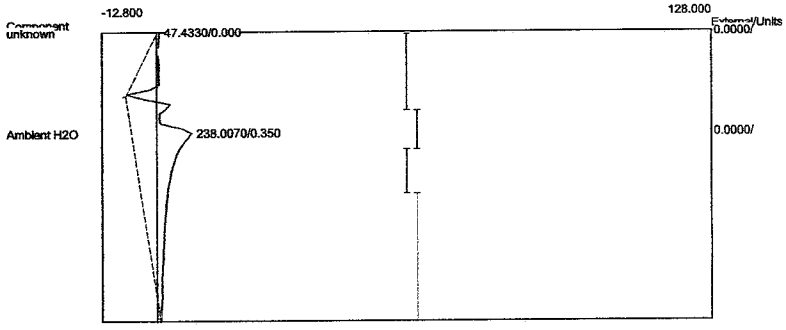
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	48.0720	0.0000	
Ambient H2O	0.366	195.1035	0.0000	
Acetaldehyde	0.833	32.8920	0.0000	
		276.0675	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:11:03
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A03.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



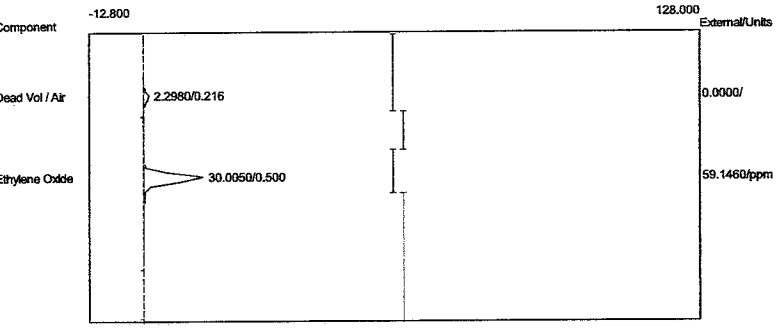
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2560	0.0000	
Ethylene Oxide	0.500	30.6480	60.4135	ppm
		32.9040	60.4135	

Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:11:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A03.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



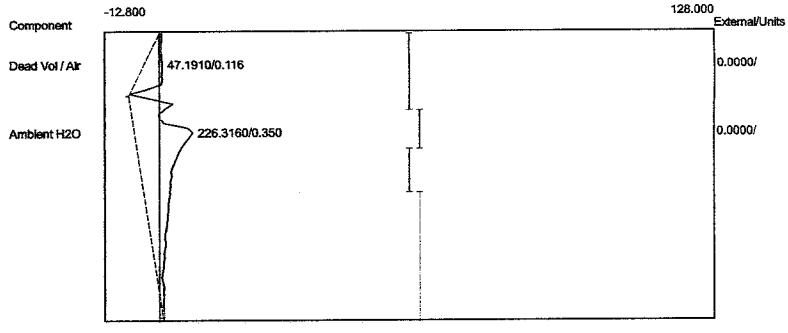
Component	Retention	Area	External	Units
Ambient H2O	0.350	238.0070	0.0000	
		238.0070	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:16:03
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A04.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



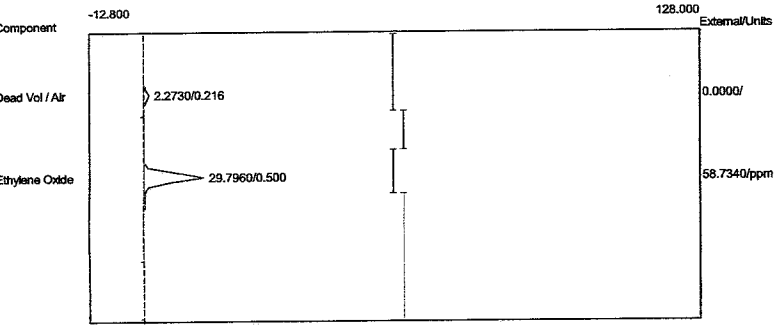
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2980	0.0000	
Ethylene Oxide	0.500	30.0050	59.1460	ppm
		32.3030	59.1460	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:16:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A04.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



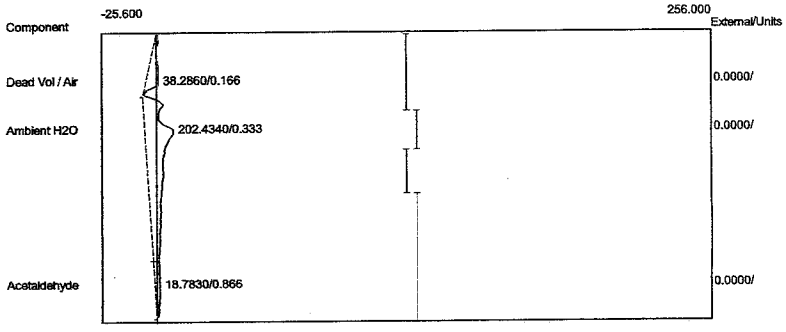
Component	Retention	Area	External	Units
Dead Vol / Air	0.116	47.1910	0.0000	
Ambient H2O	0.350	226.3160	0.0000	
		273.5070	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:21:03
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A05.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



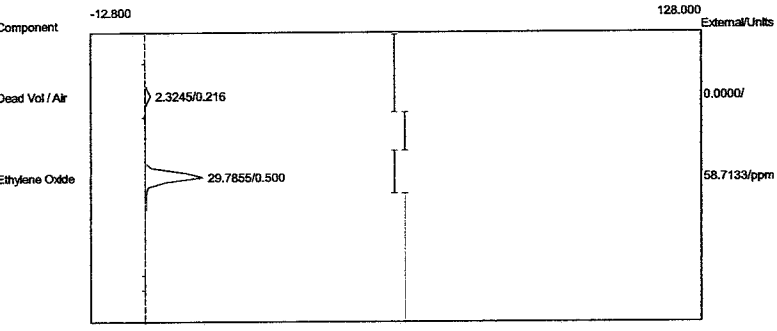
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2730	0.0000	
Ethylene Oxide	0.500	29.7960	58.7340	ppm
		32.0690	58.7340	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:21:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A05.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



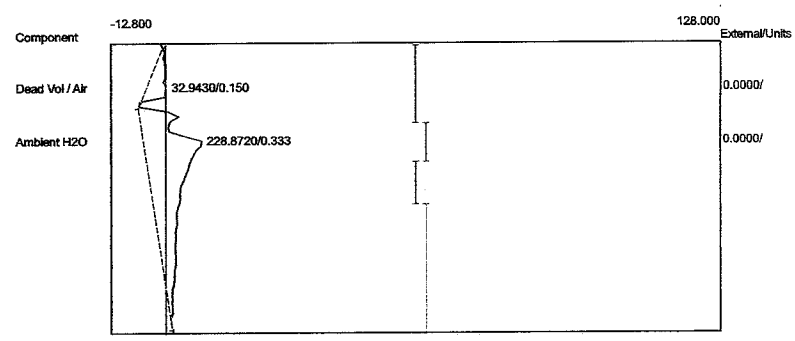
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	38.2860	0.0000	
Ambient H2O	0.333	202.4340	0.0000	
Acetaldehyde	0.866	18.7830	0.0000	
		259.5030	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:26:02
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A06.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



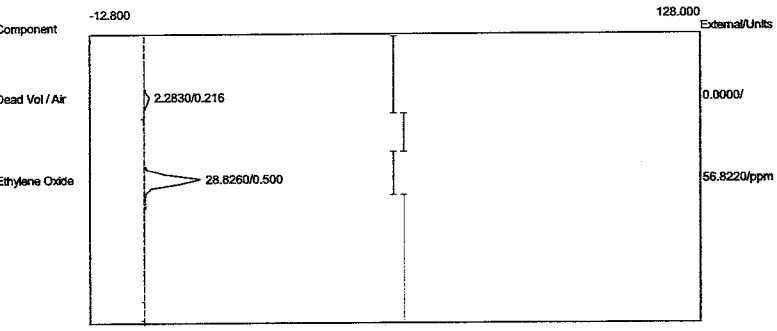
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3245	0.0000	
Ethylene Oxide	0.500	29.7855	58.7133	ppm
		32.1100	58.7133	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:26:02
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A06.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



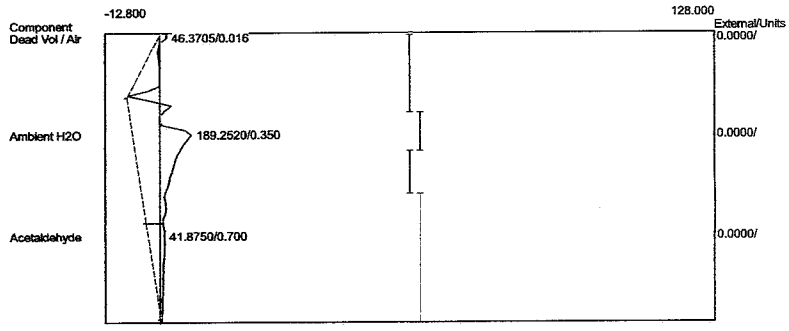
Component	Retention	Area	External	Units
Dead Vol / Air	0.150	32.9430	0.0000	
Ambient H2O	0.333	228.8720	0.0000	
		261.8150	0.0000	

Lab name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:31:03
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A07.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



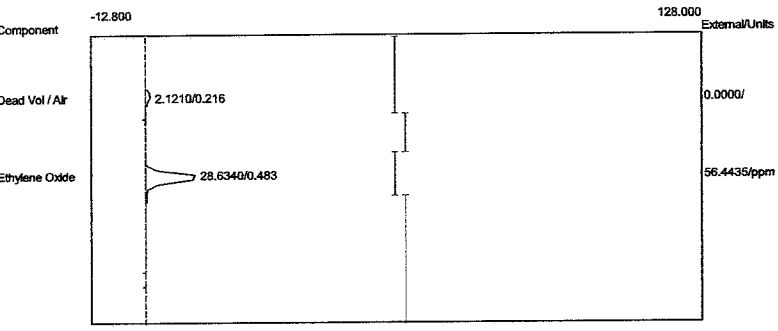
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2830	0.0000	
Ethylene Oxide	0.500	28.8260	56.8220	ppm
		31.1090	56.8220	

Lab name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:31:03
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A07.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



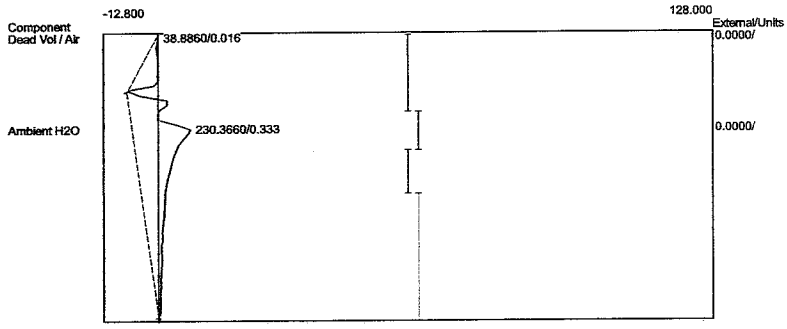
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	46.3705	0.0000	
Ambient H2O	0.350	189.2520	0.0000	
Acetaldehyde	0.700	41.8750	0.0000	
		277.4975	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:36:06
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A08.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



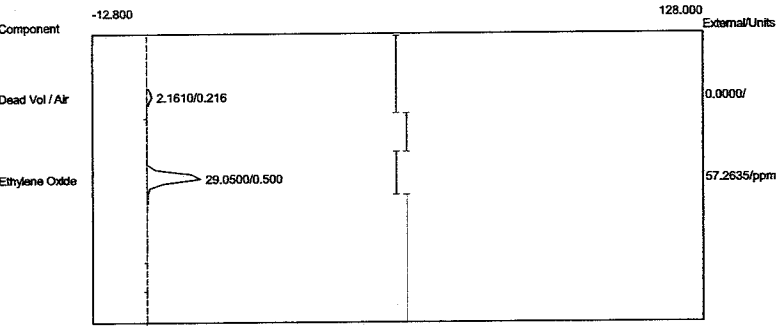
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1210	0.0000	
Ethylene Oxide	0.483	28.6340	56.4435	ppm
		30.7550	56.4435	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:36:06
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A08.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



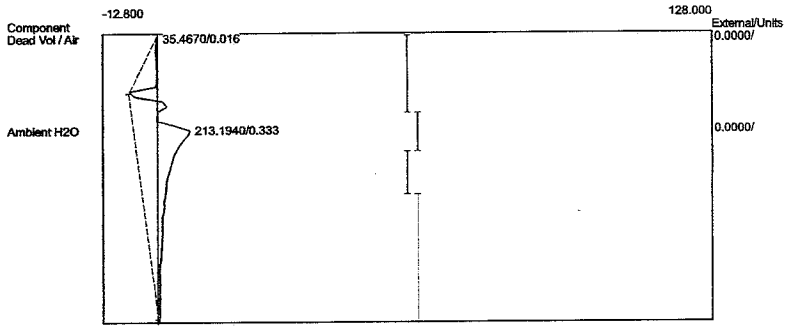
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	38.8860	0.0000	
Ambient H2O	0.333	230.3660	0.0000	
		269.2520	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:41:06
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A09.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



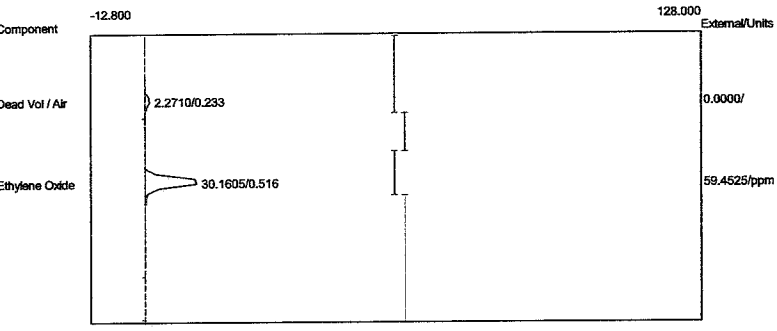
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1610	0.0000	
Ethylene Oxide	0.500	29.0500	57.2635	ppm
		31.2110	57.2635	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:41:06
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A09.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



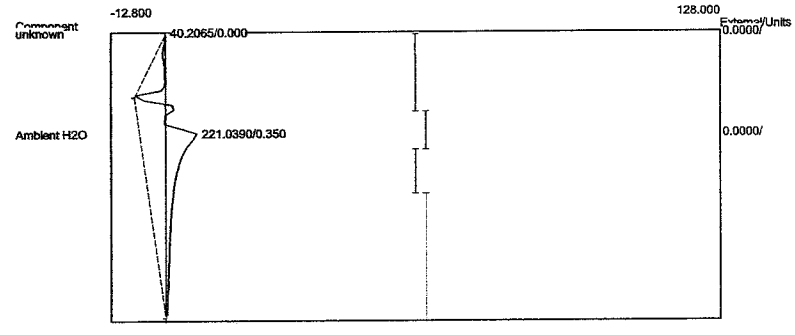
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	35.4670	0.0000	
Ambient H2O	0.333	213.1940	0.0000	
		248.6610	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:46:05
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A10.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



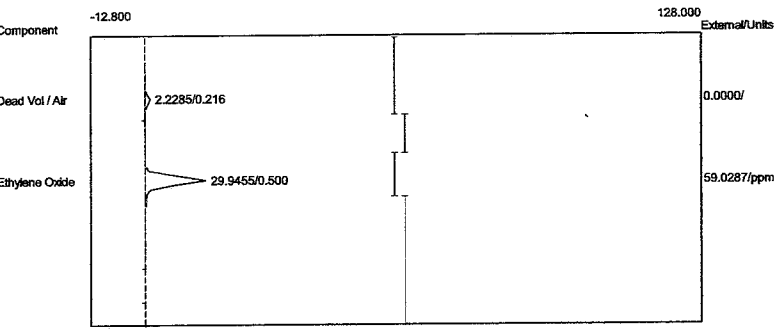
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2710	0.0000	
Ethylene Oxide	0.516	30.1605	59.4525	ppm
		32.4315	59.4525	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:46:05
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A10.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



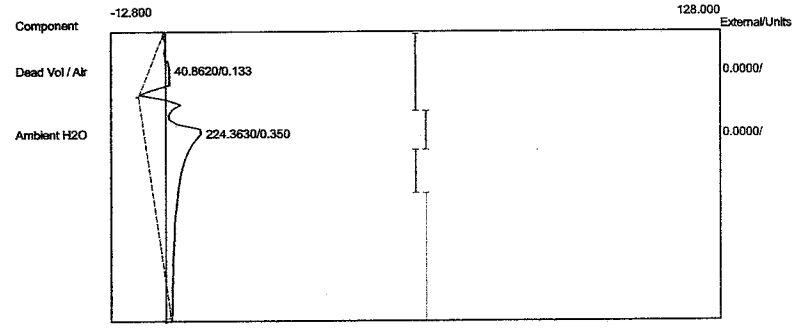
Component	Retention	Area	External	Units
Ambient H2O	0.350	221.0390	0.0000	
		221.0390	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:51:22
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A11.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



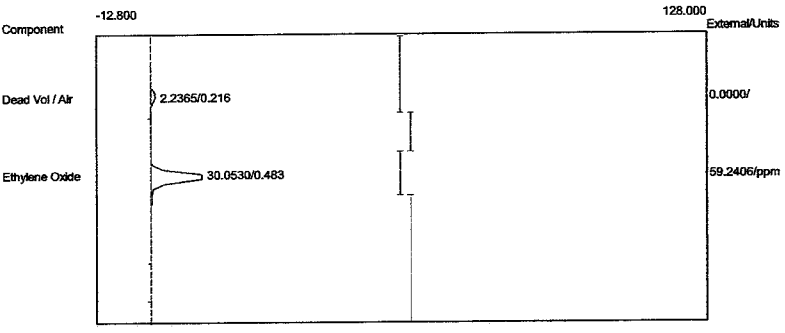
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2285	0.0000	
Ethylene Oxide	0.500	29.9455	59.0287	ppm
		32.1740	59.0287	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:51:22
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A11.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



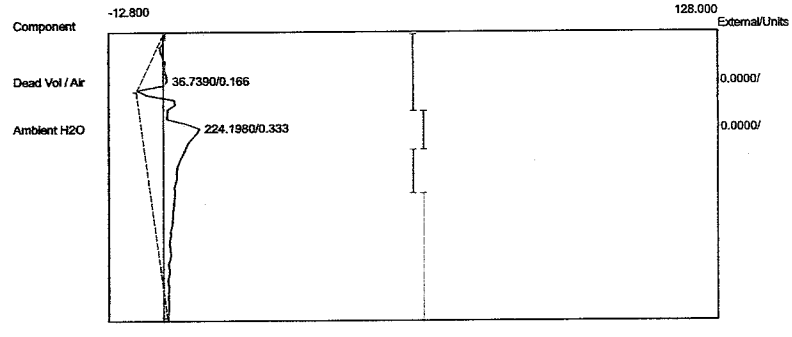
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	40.8620	0.0000	
Ambient H2O	0.350	224.3630	0.0000	
		265.2250	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:56:12
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-1A12.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2365	0.0000	
Ethylene Oxide	0.483	30.0530	59.2406	ppm
		32.2895	59.2406	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#1Aer
Analysis date: 12/09/2019 08:56:12
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-1A12.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer

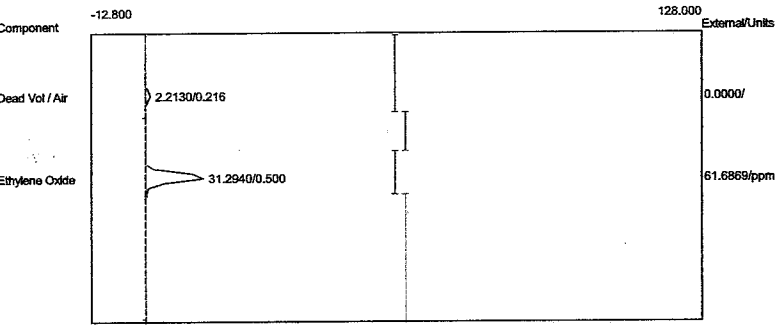


Component	Retention	Area	External	Units
Dead Vol / Air	0.166	36.7390	0.0000	
Ambient H2O	0.333	224.1980	0.0000	
		260.9370	0.0000	

APPENDIX D

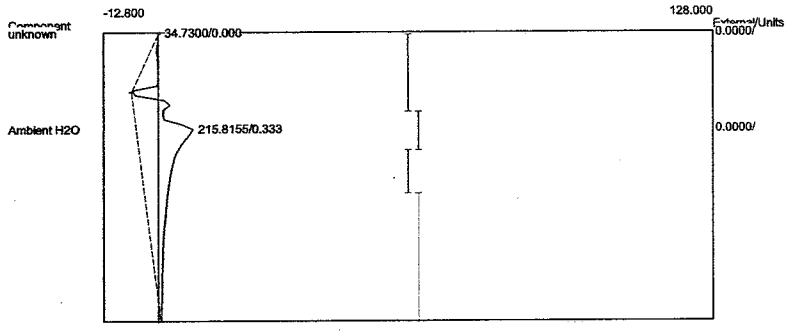
Run #2 Chromatograms – Backvent

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 09:55:01
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B01.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



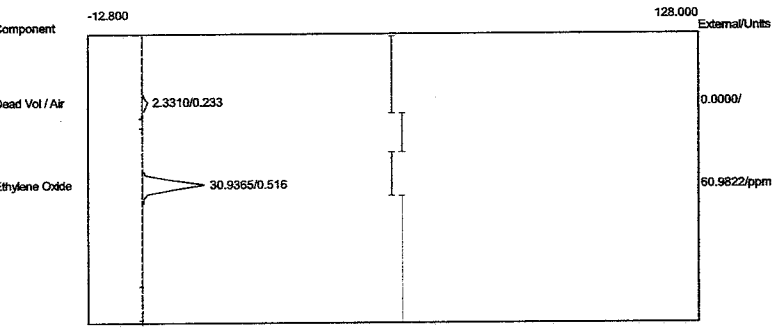
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2130	0.0000	
Ethylene Oxide	0.500	31.2940	61.6869	ppm
		33.5070	61.6869	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 09:55:01
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B01.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



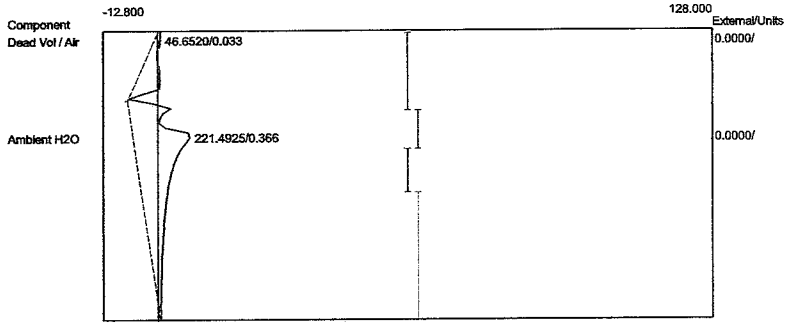
Component	Retention	Area	External	Units
Ambient H2O	0.333	215.8155	0.0000	
		215.8155	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 09:56:05
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B02.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



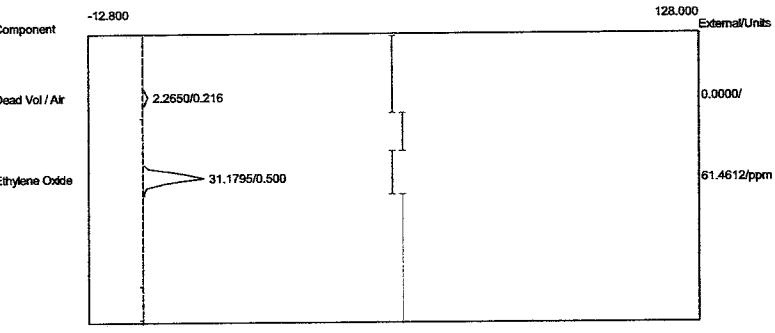
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3310	0.0000	
Ethylene Oxide	0.516	30.9365	60.9822	ppm
		33.2675	60.9822	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 09:56:05
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B02.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



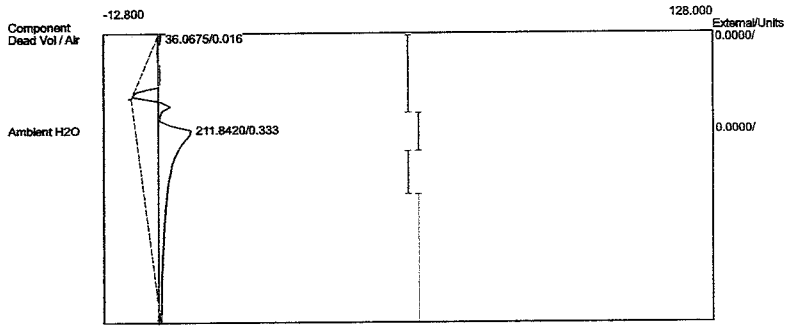
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	46.6520	0.0000	
Ambient H2O	0.366	221.4925	0.0000	
		268.1445	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 09:57:11
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B03.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



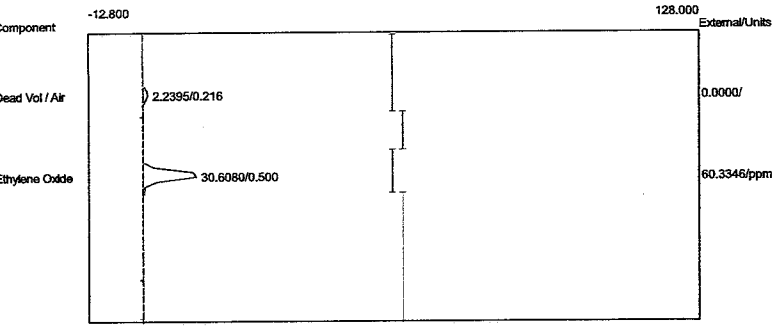
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2650	0.0000	
Ethylene Oxide	0.500	31.1795	61.4612	ppm
		33.4445	61.4612	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 09:57:11
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B03.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



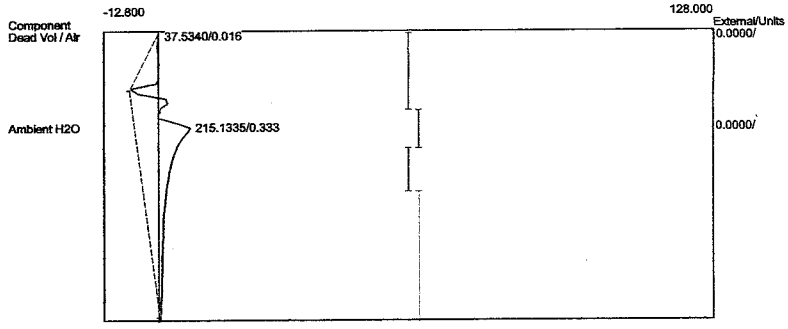
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	36.0675	0.0000	
Ambient H2O	0.333	211.8420	0.0000	
		247.9095	0.0000	

Lab Name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 09:59:06
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B04.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



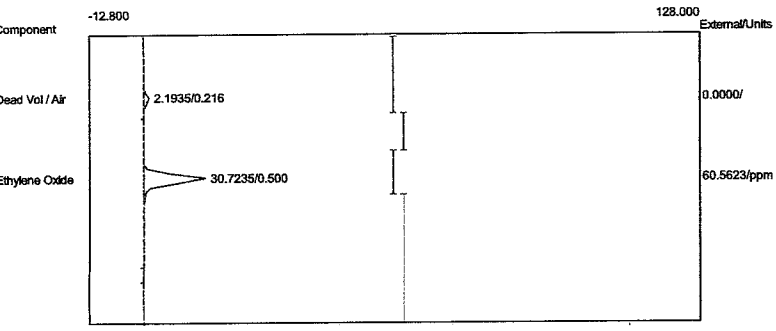
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2395	0.0000	
Ethylene Oxide	0.500	30.6080	60.3346	ppm
		32.8475	60.3346	

Lab Name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 09:59:06
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B04.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



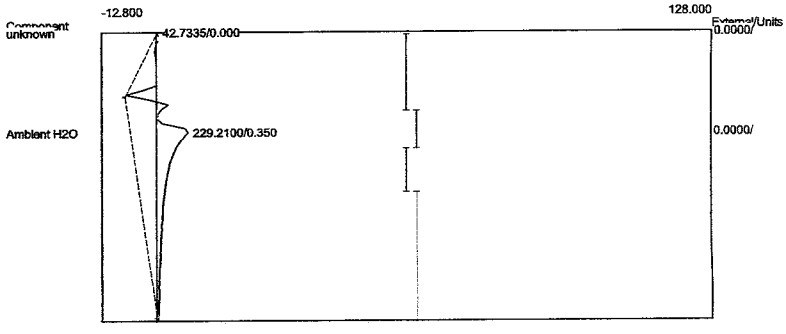
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	37.5340	0.0000	
Ambient H2O	0.333	215.1335	0.0000	
		252.6675	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:00:14
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B05.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



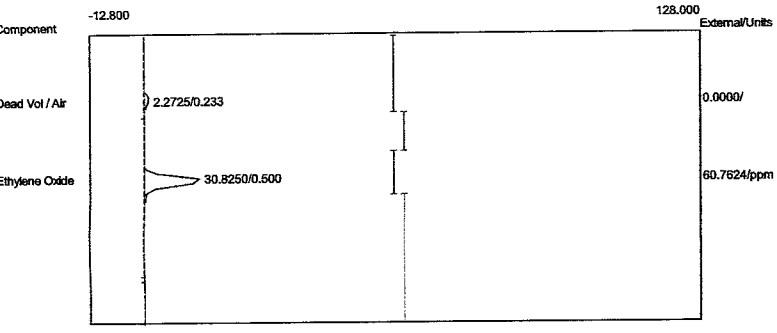
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1935	0.0000	
Ethylene Oxide	0.500	30.7235	60.5623	ppm
		32.9170	60.5623	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:00:14
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B05.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



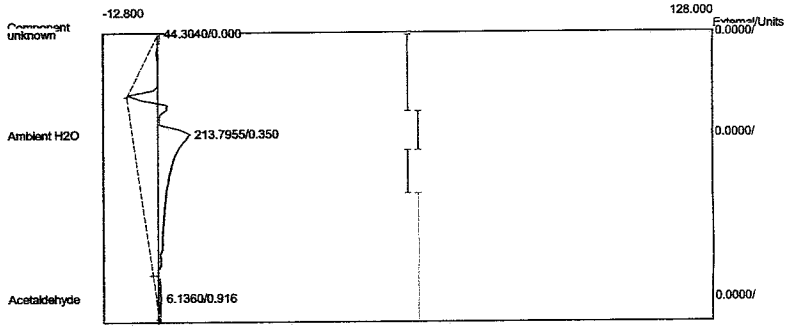
Component	Retention	Area	External	Units
Ambient H2O	0.350	229.2100	0.0000	
		229.2100	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:01:23
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B06.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



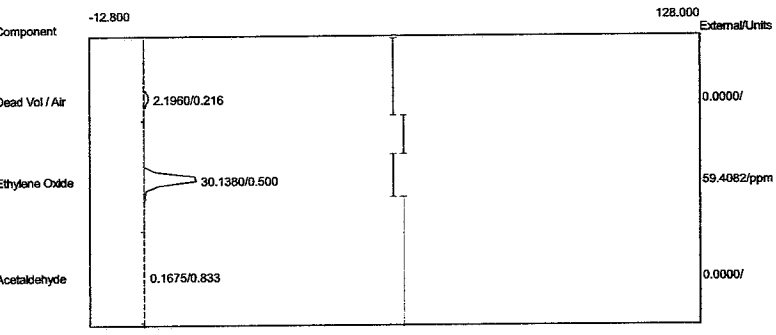
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2725	0.0000	
Ethylene Oxide	0.500	30.8250	60.7624	ppm
		33.0975	60.7624	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:01:23
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B06.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



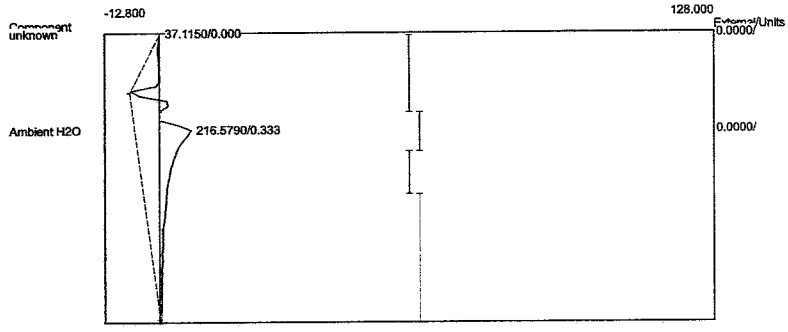
Component	Retention	Area	External	Units
Ambient H2O	0.350	213.7955	0.0000	
Acetaldehyde	0.916	6.1360	0.0000	
		219.9315	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:03:57
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B08.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



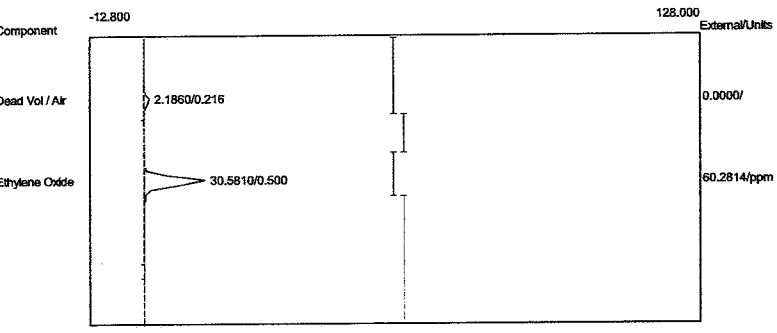
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1960	0.0000	
Ethylene Oxide	0.500	30.1380	59.4082	ppm
Acetaldehyde	0.833	0.1675	0.0000	
		32.5015	59.4082	

Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:03:57
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B08.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



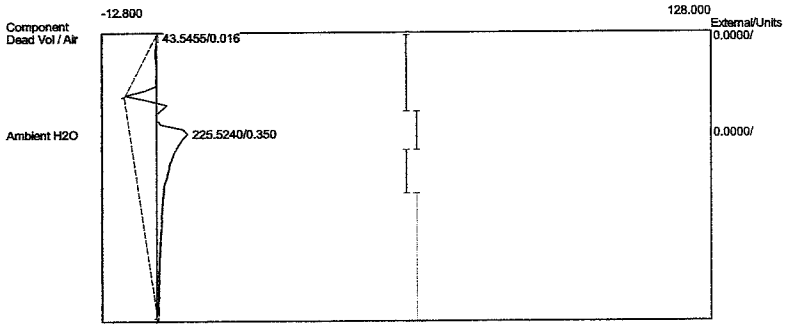
Component	Retention	Area	External	Units
Ambient H2O	0.333	216.5790	0.0000	
		216.5790	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:02:34
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B07.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



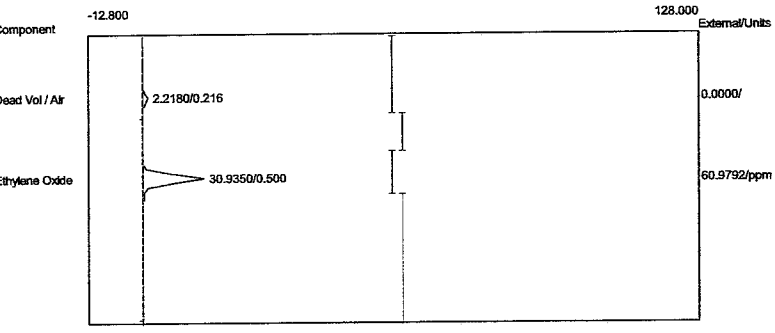
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1860	0.0000	
Ethylene Oxide	0.500	30.5810	60.2814	ppm
		32.7670	60.2814	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:02:34
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B07.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



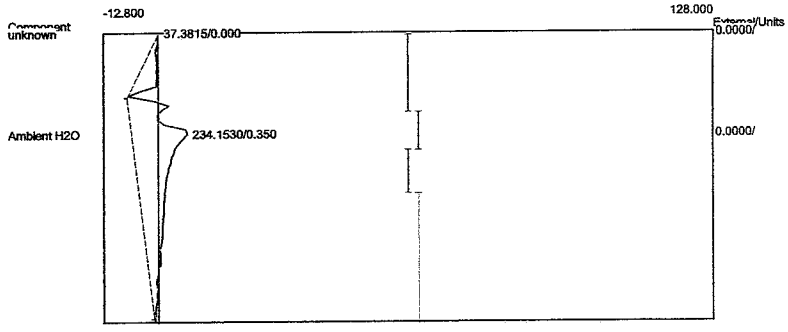
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	43.5455	0.0000	
Ambient H2O	0.350	225.5240	0.0000	
		269.0695	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:05:17
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B09.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



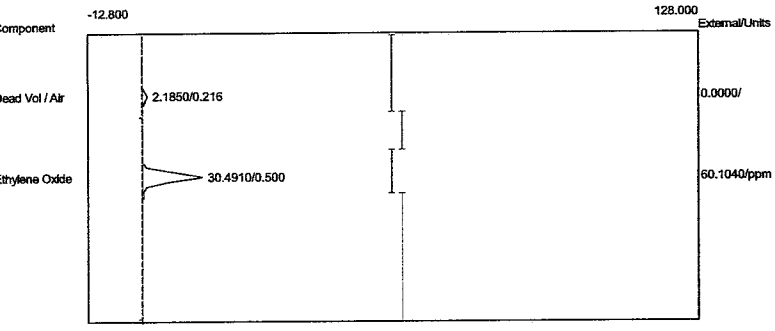
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2180	0.0000	
Ethylene Oxide	0.500	30.9350	60.9792	ppm
		33.1530	60.9792	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:05:17
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B09.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



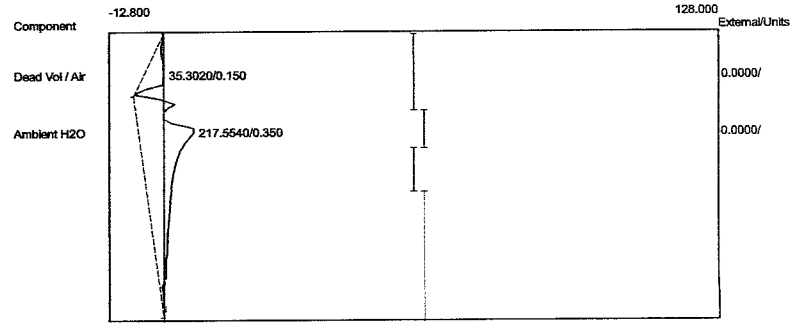
Component	Retention	Area	External	Units
Ambient H2O	0.350	234.1530	0.0000	
		234.1530	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:06:41
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B10.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



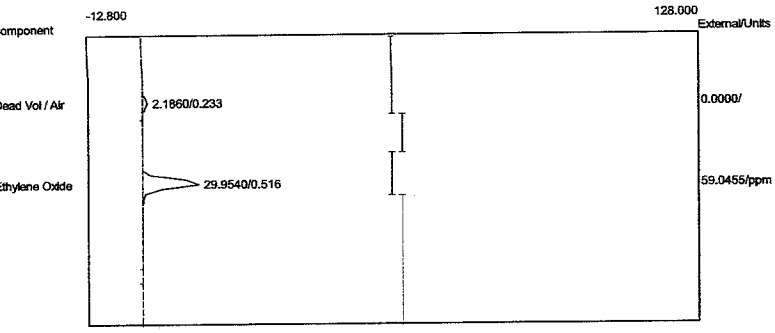
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1850	0.0000	
Ethylene Oxide	0.500	30.4910	60.1040	ppm
		32.6760	60.1040	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:06:41
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B10.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



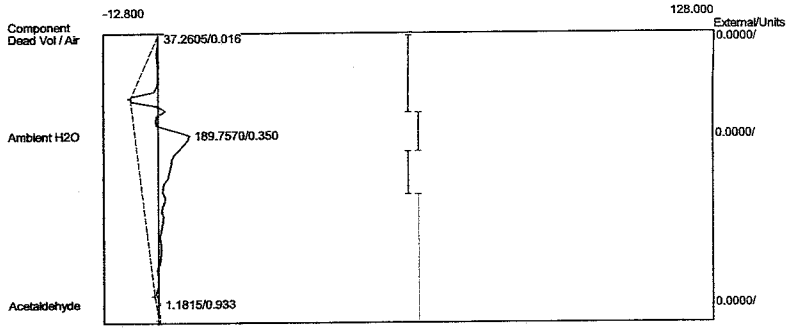
Component	Retention	Area	External	Units
Dead Vol / Air	0.150	35.3020	0.0000	
Ambient H2O	0.350	217.5540	0.0000	
		252.8560	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:07:44
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B11.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



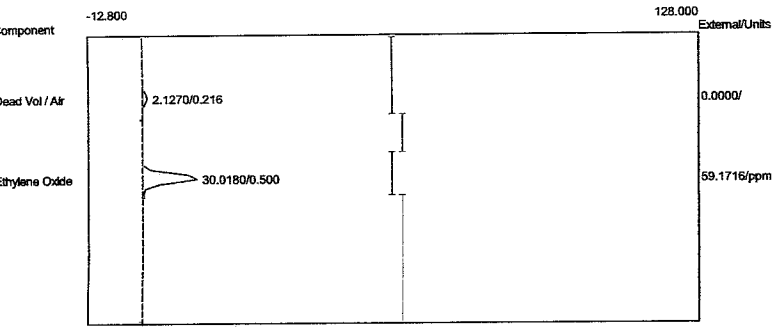
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.1860	0.0000	
Ethylene Oxide	0.516	29.9540	59.0455	ppm
		32.1400	59.0455	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:07:44
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B11.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



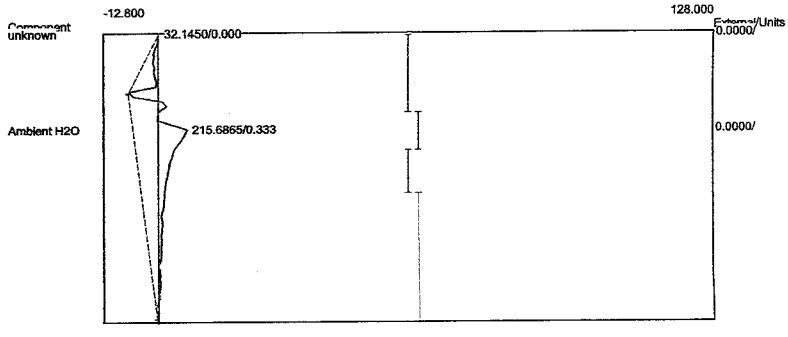
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	37.2605	0.0000	
Ambient H2O	0.350	189.7570	0.0000	
Acetaldehyde	0.933	1.1815	0.0000	
		228.1990	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:08:47
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2B12.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1270	0.0000	
Ethylene Oxide	0.500	30.0180	59.1716	ppm
		32.1450	59.1716	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2BV
Analysis date: 12/09/2019 10:08:47
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2B12.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer

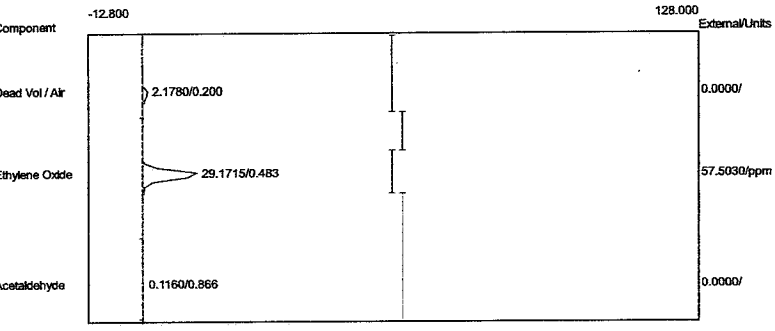


Component	Retention	Area	External	Units
Ambient H2O	0.333	215.6865	0.0000	
		215.6865	0.0000	

APPENDIX E

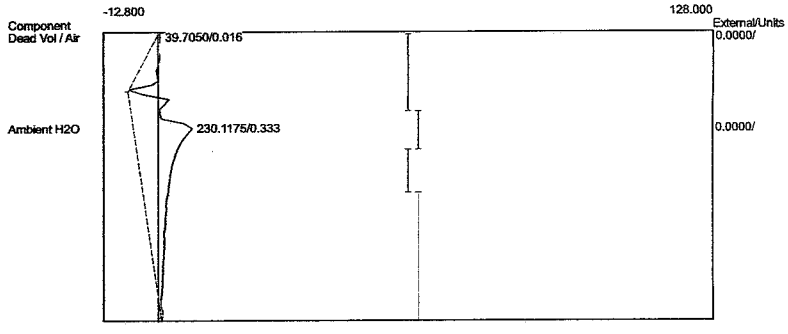
Run #2 Chromatograms – Aeration

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:11:20
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A01.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



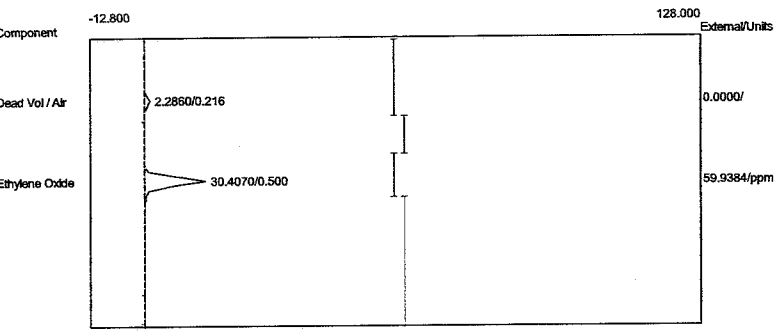
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	2.1780	0.0000	
Ethylene Oxide	0.483	29.1715	57.5030	ppm
Acetaldehyde	0.866	0.1160	0.0000	
		31.4655	57.5030	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:11:20
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A01.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



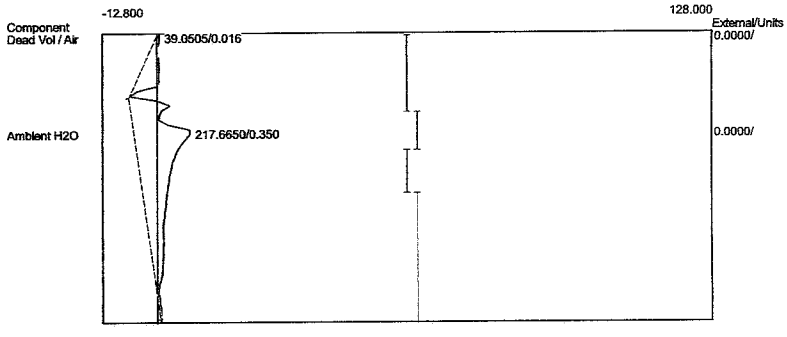
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	39.7050	0.0000	
Ambient H2O	0.333	230.1175	0.0000	
		269.8225	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:16:18
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A02.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



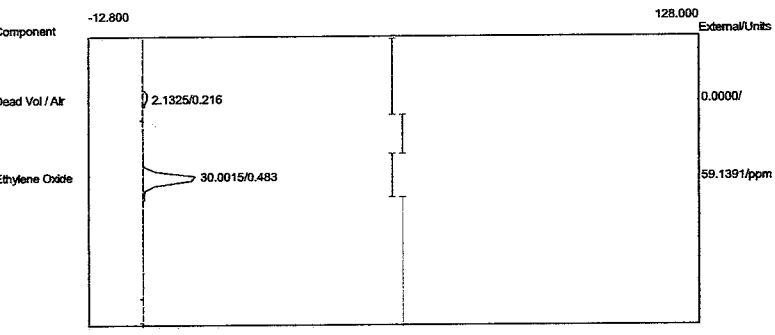
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2860	0.0000	
Ethylene Oxide	0.500	30.4070	59.9384	ppm
		32.6930	59.9384	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:16:18
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A02.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



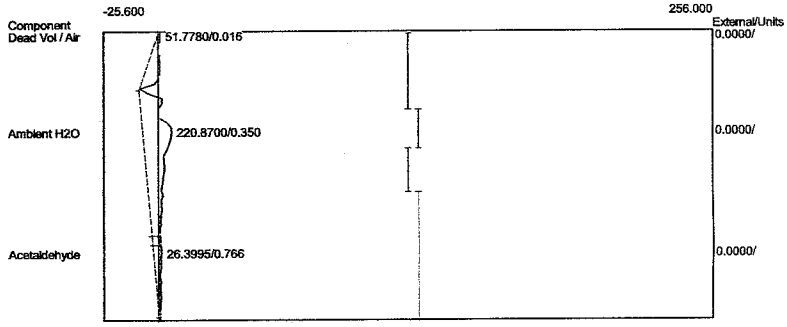
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	39.0505	0.0000	
Ambient H2O	0.350	217.6650	0.0000	
		256.7155	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:21:10
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A03.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



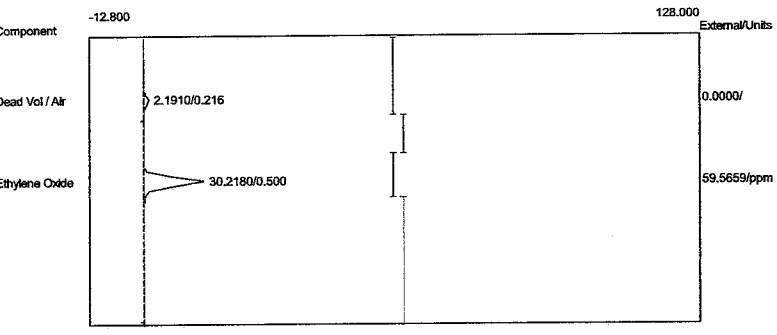
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1325	0.0000	
Ethylene Oxide	0.483	30.0015	59.1391	ppm
		32.1340	59.1391	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:21:10
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A03.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



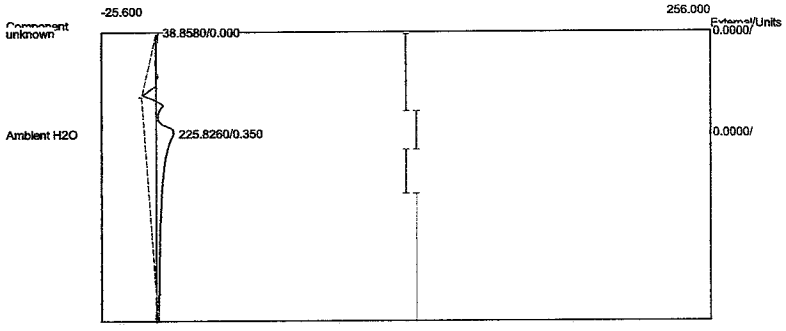
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	51.7780	0.0000	
Ambient H2O	0.350	220.8700	0.0000	
Acetaldehyde	0.766	26.3995	0.0000	
		299.0475	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:26:30
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A04.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



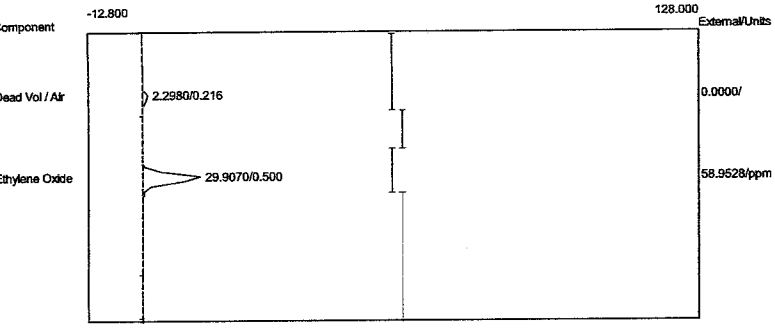
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1910	0.0000	
Ethylene Oxide	0.500	30.2180	59.5659	ppm
		32.4090	59.5659	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:26:30
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A04.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



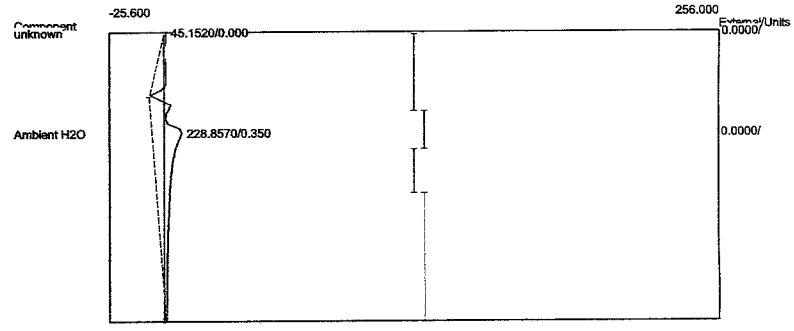
Component	Retention	Area	External	Units
Ambient H2O	0.350	225.8260	0.0000	
		225.8260	0.0000	

Lab name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:31:18
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A05.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



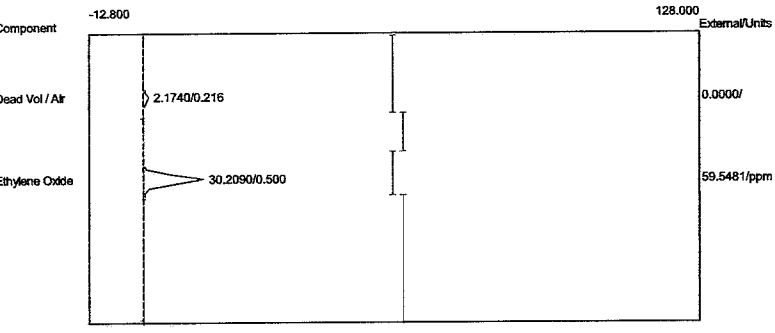
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2980	0.0000	
Ethylene Oxide	0.500	29.9070	58.9528	ppm
		32.2050	58.9528	

Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:31:18
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A05.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



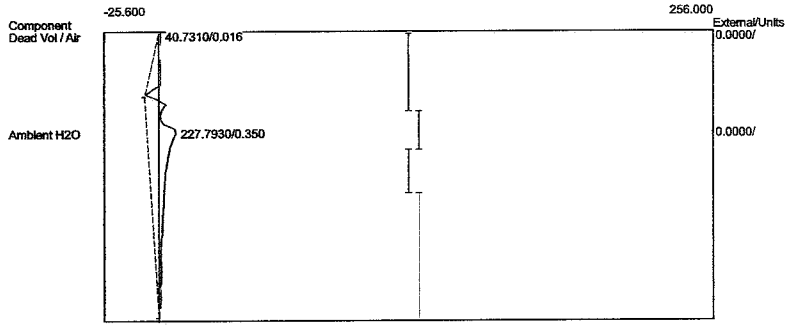
Component	Retention	Area	External	Units
Ambient H2O	0.350	228.8570	0.0000	
		228.8570	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:36:05
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A06.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



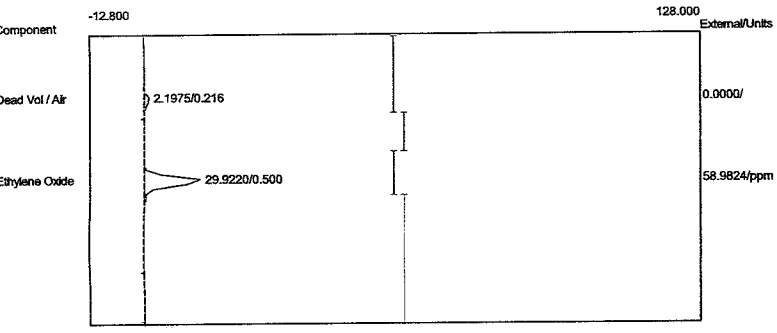
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1740	0.0000	
Ethylene Oxide	0.500	30.2090	59.5481	ppm
		32.3830	59.5481	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:36:05
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A06.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



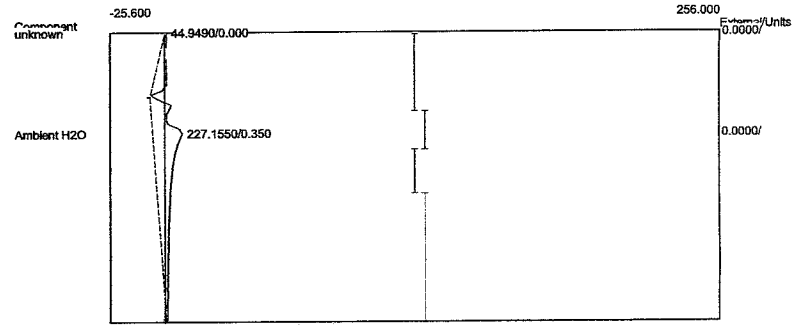
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	40.7310	0.0000	
Ambient H2O	0.350	227.7930	0.0000	
		268.5240	0.0000	

Lab Name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:41:45
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A07.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



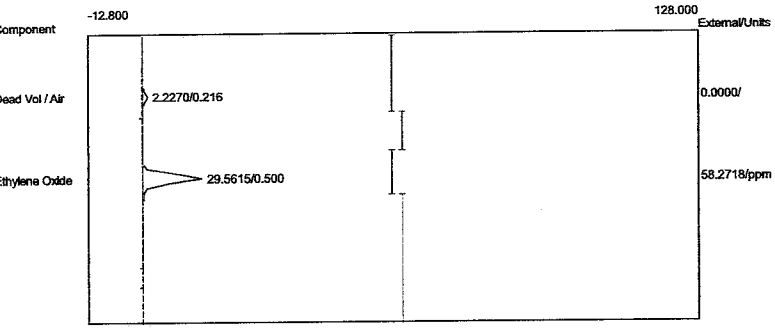
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1975	0.0000	
Ethylene Oxide	0.500	29.9220	58.9824	ppm
		32.1195	58.9824	

Lab Name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:41:45
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A07.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



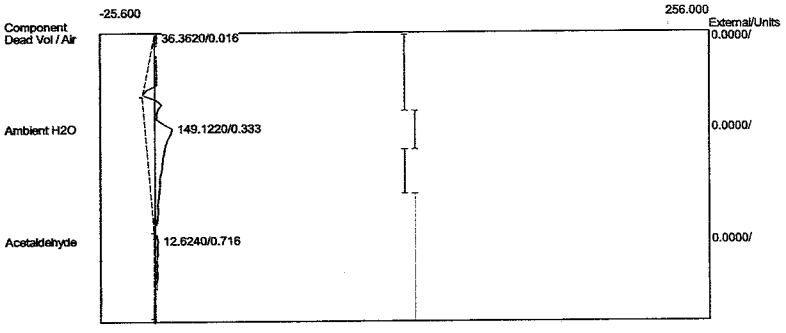
Component	Retention	Area	External	Units
Ambient H2O	0.350	227.1550	0.0000	
		227.1550	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:46:04
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A08.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



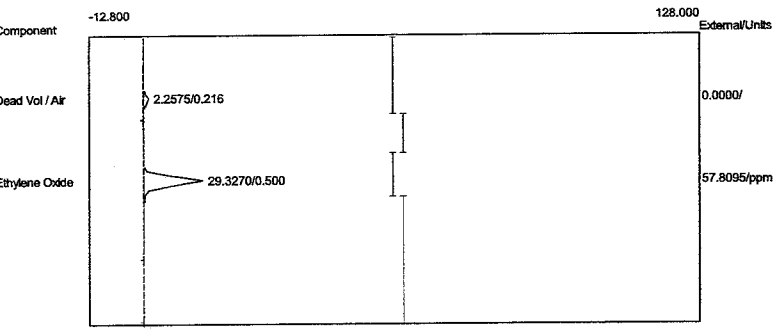
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2270	0.0000	
Ethylene Oxide	0.500	29.5615	58.2718	ppm
		31.7885	58.2718	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:46:04
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A08.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



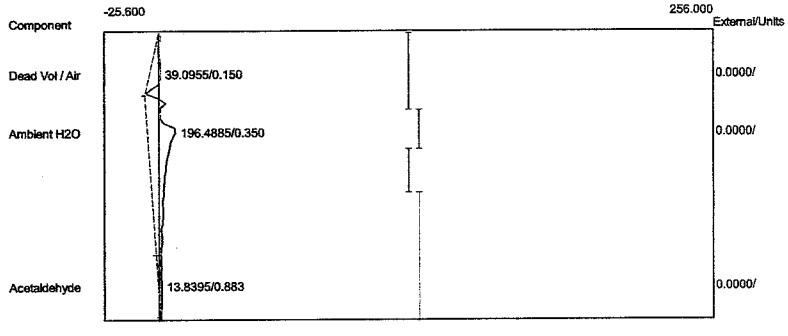
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	36.3620	0.0000	
Ambient H2O	0.333	149.1220	0.0000	
Acetaldehyde	0.716	12.6240	0.0000	
		198.1080	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:51:22
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A09.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



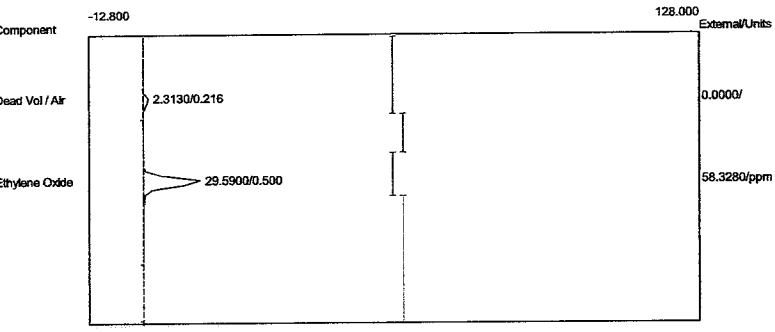
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2575	0.0000	
Ethylene Oxide	0.500	29.3270	57.8095	ppm
		31.5845	57.8095	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:51:22
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A09.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



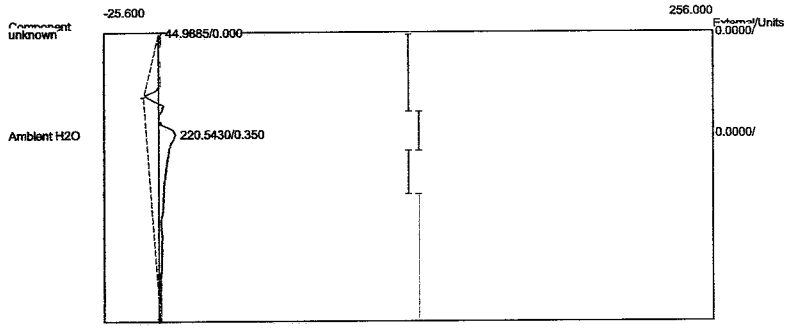
Component	Retention	Area	External	Units
Dead Vol / Air	0.150	39.0955	0.0000	
Ambient H2O	0.350	196.4885	0.0000	
Acetaldehyde	0.883	13.8395	0.0000	
		249.4235	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:56:47
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A10.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



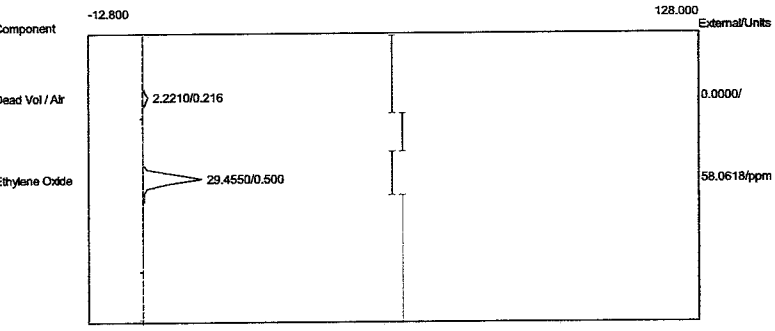
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3130	0.0000	
Ethylene Oxide	0.500	29.5900	58.3280	ppm
		31.9030	58.3280	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 10:56:47
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A10.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



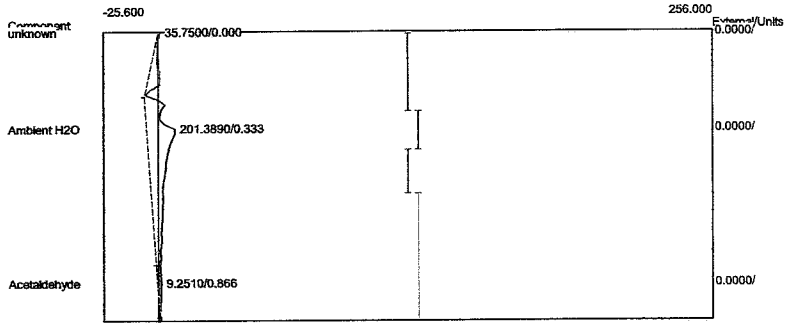
Component	Retention	Area	External	Units
Ambient H2O	0.350	220.5430	0.0000	
		220.5430	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 11:01:08
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A11.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



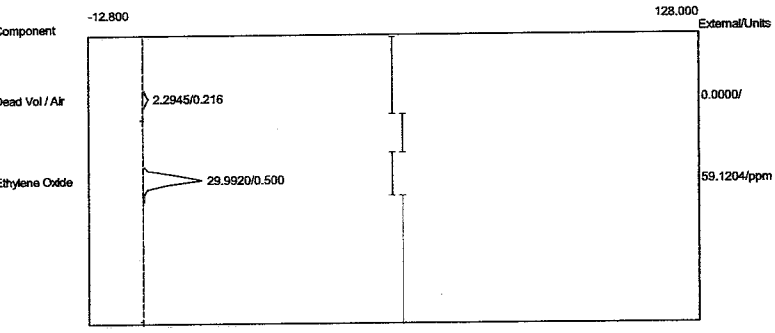
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2210	0.0000	
Ethylene Oxide	0.500	29.4550	58.0618	ppm
		31.6760	58.0618	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 11:01:08
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A11.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



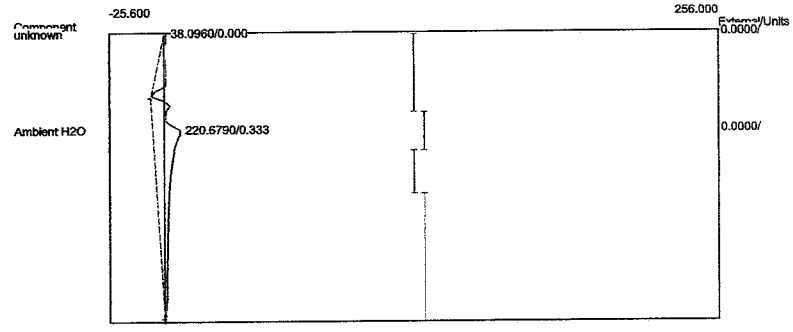
Component	Retention	Area	External	Units
Ambient H2O	0.333	201.3890	0.0000	
Acetaldehyde	0.866	9.2510	0.0000	
		210.6400	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 11:06:35
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-2A12.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2945	0.0000	
Ethylene Oxide	0.500	29.9920	59.1204	ppm
		32.2865	59.1204	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#2Aer
Analysis date: 12/09/2019 11:06:35
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-2A12.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer

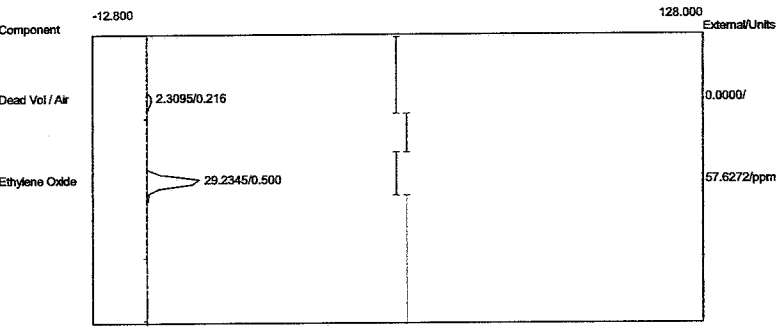


Component	Retention	Area	External	Units
Ambient H2O	0.333	220.6790	0.0000	
		220.6790	0.0000	

APPENDIX F

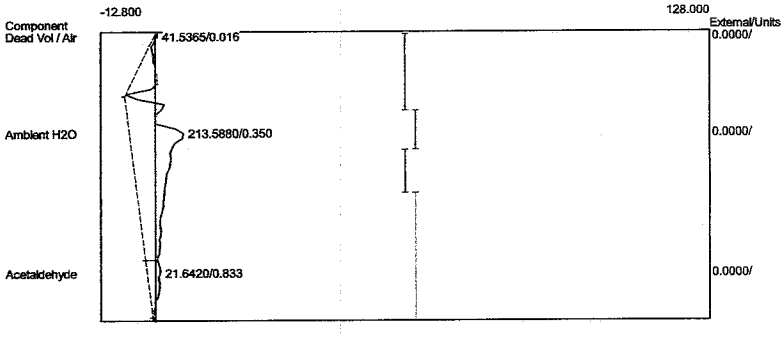
Run #3 Chromatograms – Backvent

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:19:39
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B01.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



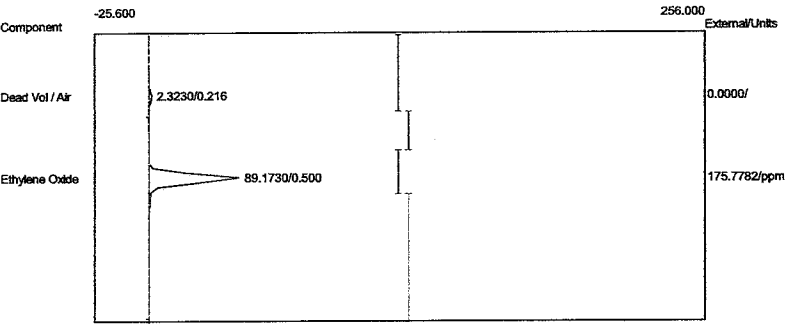
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3095	0.0000	
Ethylene Oxide	0.500	29.2345	57.6272	ppm
		31.5440	57.6272	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:19:39
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B01.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



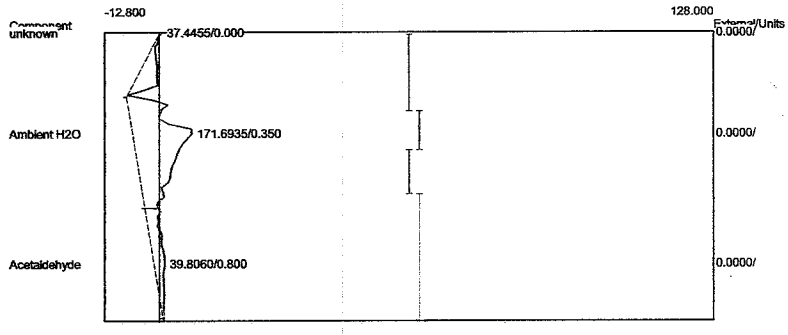
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	41.5365	0.0000	
Ambient H2O	0.350	213.5880	0.0000	
Acetaldehyde	0.833	21.6420	0.0000	
		276.7665	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:20:43
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B02.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



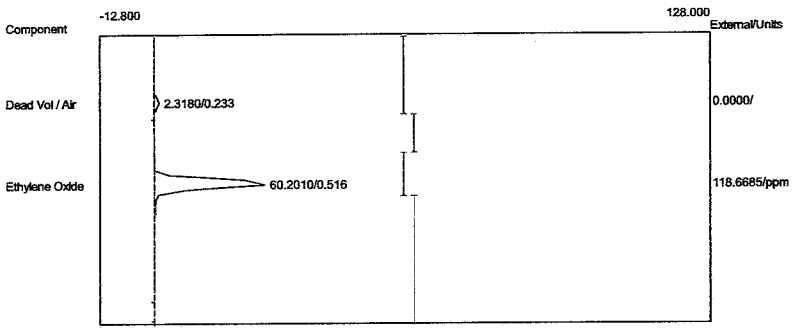
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3230	0.0000	
Ethylene Oxide	0.500	89.1730	175.7782	ppm
		91.4960	175.7782	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:20:43
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B02.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



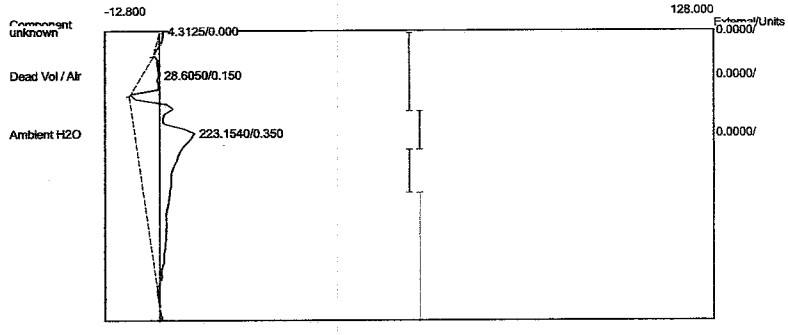
Component	Retention	Area	External	Units
Ambient H2O	0.350	171.6935	0.0000	
Acetaldehyde	0.800	39.8060	0.0000	
		211.4995	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:21:49
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B03.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



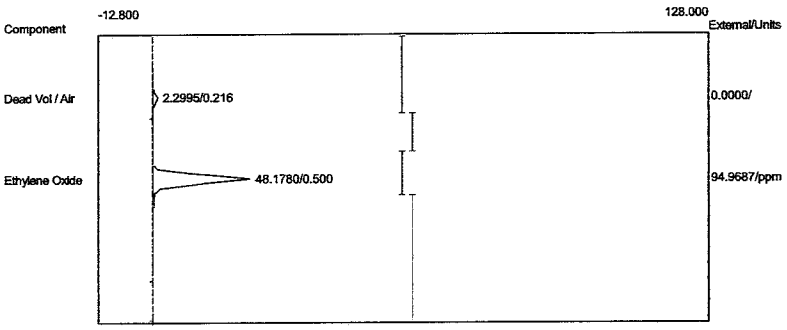
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.3180	0.0000	
Ethylene Oxide	0.516	60.2010	118.6685	ppm
		62.5190	118.6685	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:21:49
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B03.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



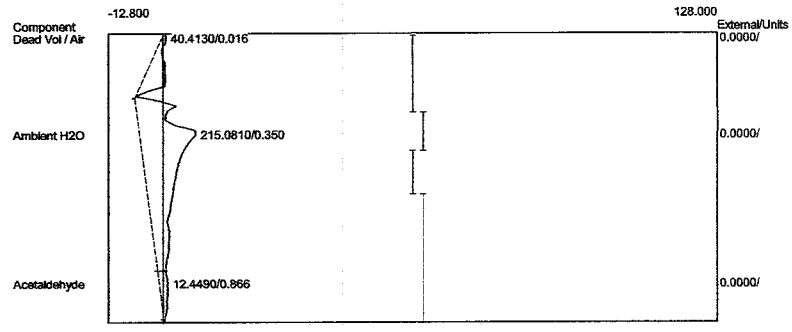
Component	Retention	Area	External	Units
Dead Vol / Air	0.150	28.6050	0.0000	
Ambient H2O	0.350	223.1540	0.0000	
		251.7590	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:22:55
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B04.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



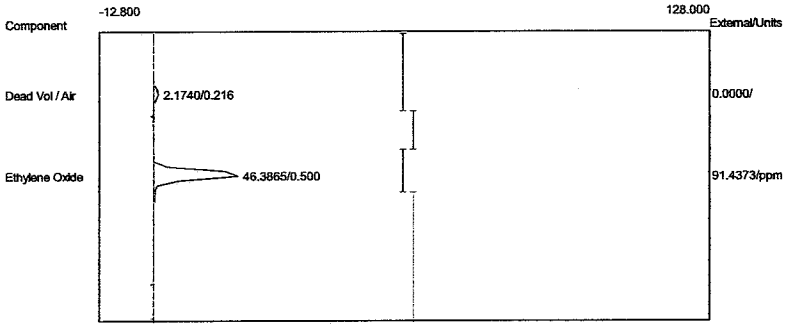
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2995	0.0000	
Ethylene Oxide	0.500	48.1780	94.9687	ppm
		50.4775	94.9687	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:22:55
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B04.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



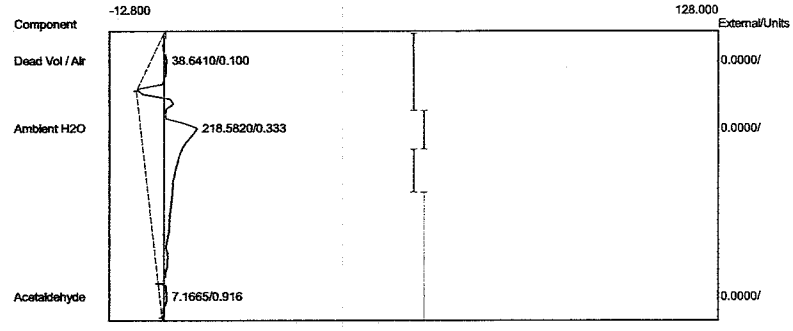
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	40.4130	0.0000	
Ambient H2O	0.350	215.0810	0.0000	
Acetaldehyde	0.866	12.4490	0.0000	
		267.9430	0.0000	

Lab name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:24:02
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B05.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



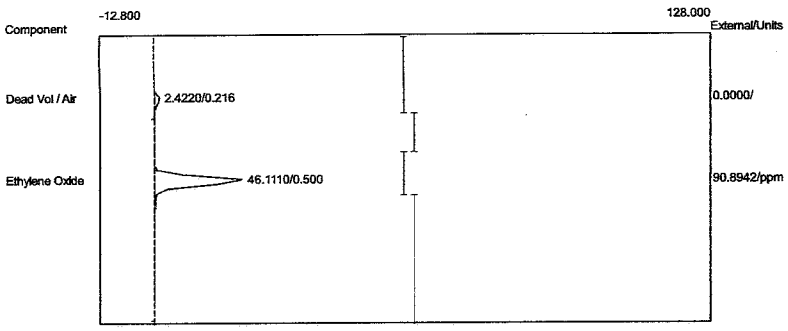
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1740	0.0000	
Ethylene Oxide	0.500	46.3865	91.4373	ppm
		48.5605	91.4373	

Lab name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:24:02
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B05.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



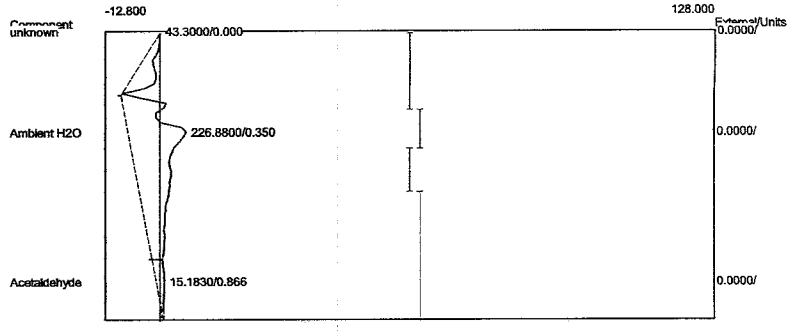
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	38.6410	0.0000	
Ambient H2O	0.333	218.5820	0.0000	
Acetaldehyde	0.916	7.1665	0.0000	
		264.3895	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:25:07
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B06.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



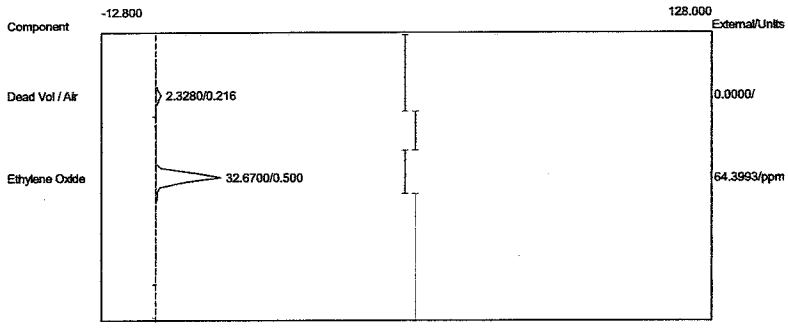
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.4220	0.0000	
Ethylene Oxide	0.500	46.1110	90.8942	ppm
		48.5330	90.8942	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:25:07
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B06.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



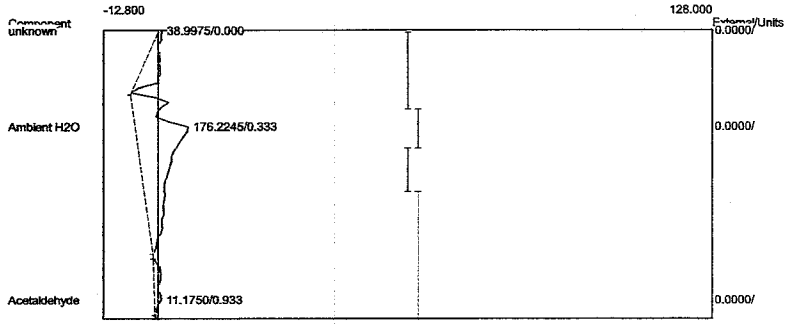
Component	Retention	Area	External	Units
Ambient H2O	0.350	226.8800	0.0000	
Acetaldehyde	0.866	15.1830	0.0000	
		242.0630	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:26:14
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B07.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



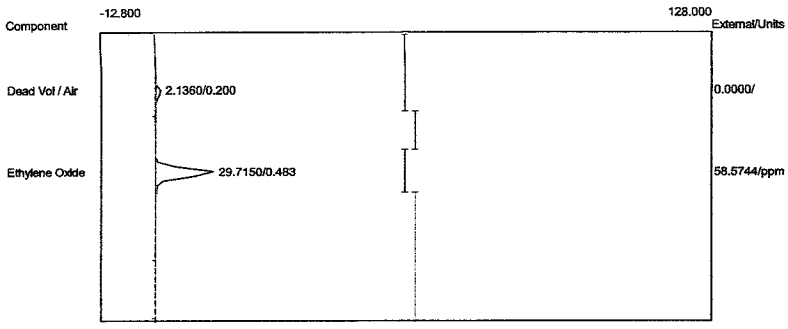
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.3280	0.0000	
Ethylene Oxide	0.500	32.6700	64.3993	ppm
		34.9980	64.3993	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:26:14
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B07.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



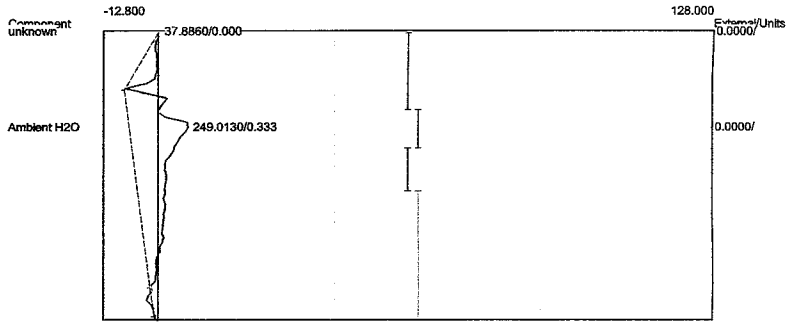
Component	Retention	Area	External	Units
Ambient H2O	0.333	176.2245	0.0000	
Acetaldehyde	0.933	11.1750	0.0000	
		187.3995	0.0000	

Lab Name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:27:36
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B08.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



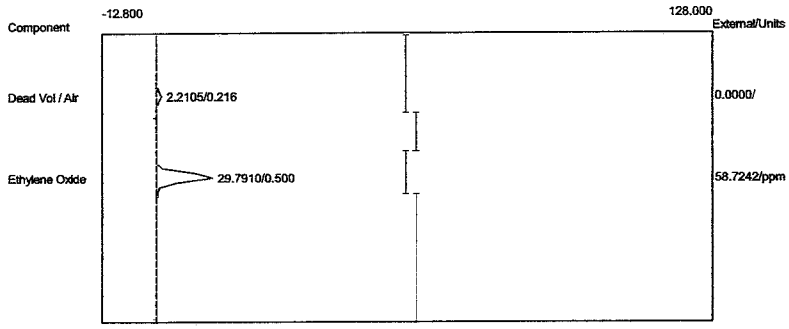
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	2.1360	0.0000	
Ethylene Oxide	0.483	29.7150	58.5744	ppm
		31.8510	58.5744	

Lab Name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:27:36
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B08.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



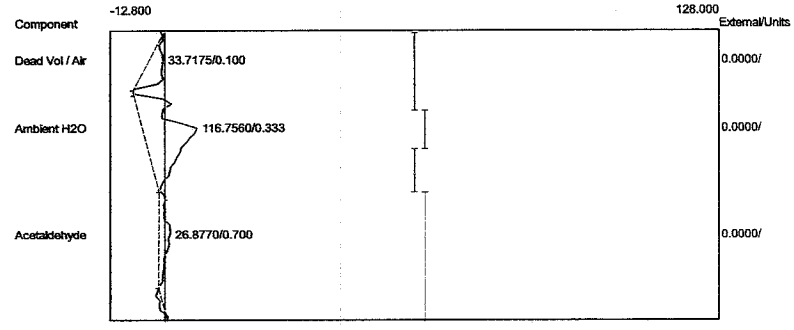
Component	Retention	Area	External	Units
Ambient H2O	0.333	249.0130	0.0000	
		249.0130	0.0000	

Lab Name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:28:53
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B09.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



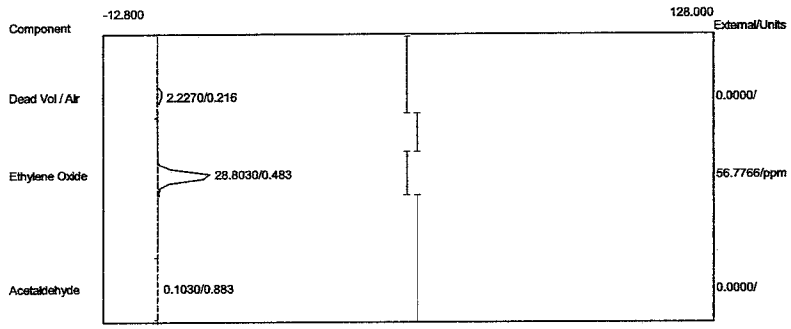
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2105	0.0000	
Ethylene Oxide	0.500	29.7910	58.7242	ppm
		32.0015	58.7242	

Lab Name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:28:53
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B09.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



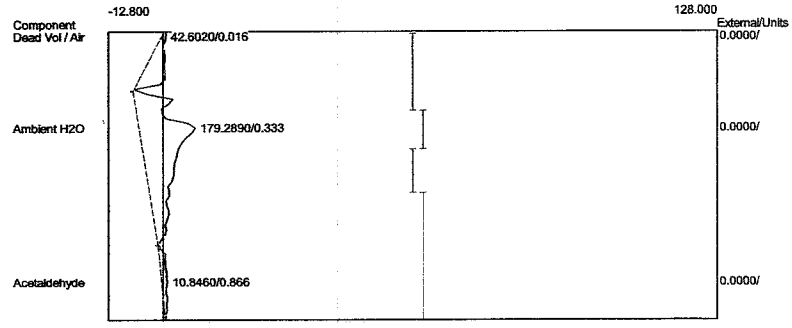
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	33.7175	0.0000	
Ambient H2O	0.333	116.7560	0.0000	
Acetaldehyde	0.700	26.8770	0.0000	
		177.3505	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:30:07
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B10.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



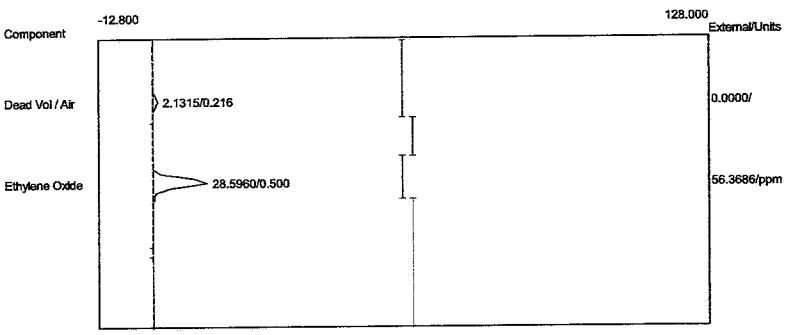
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2270	0.0000	
Ethylene Oxide	0.483	28.8030	56.7766	ppm
Acetaldehyde	0.883	0.1030	0.0000	
		31.1330	56.7766	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:30:07
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B10.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



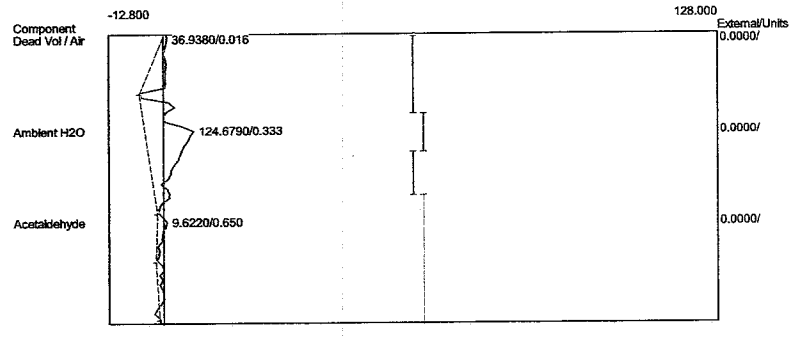
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	42.6020	0.0000	
Ambient H2O	0.333	179.2890	0.0000	
Acetaldehyde	0.866	10.8460	0.0000	
		232.7370	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:31:22
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B11.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



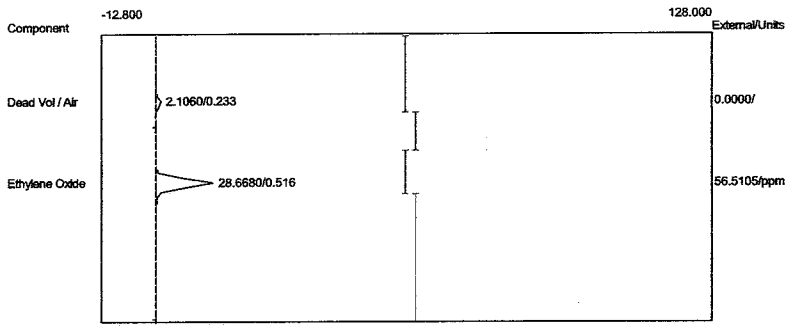
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1315	0.0000	
Ethylene Oxide	0.500	28.5960	56.3686	ppm
		30.7275	56.3686	

Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:31:22
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B11.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



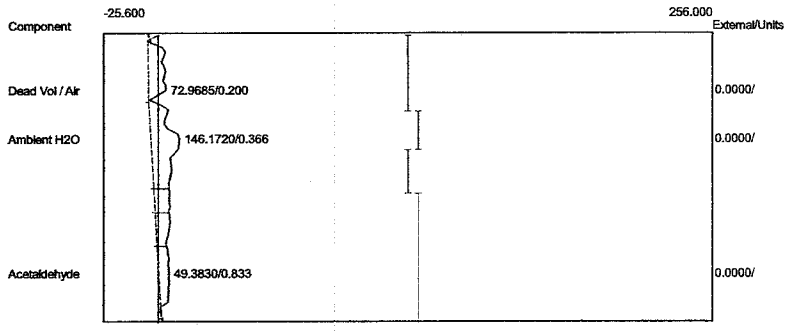
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	36.9380	0.0000	
Ambient H2O	0.333	124.6790	0.0000	
Acetaldehyde	0.650	9.6220	0.0000	
		171.2390	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:33:31
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3B12.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.1060	0.0000	
Ethylene Oxide	0.516	28.6680	56.5105	ppm
		30.7740	56.5105	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3BV
Analysis date: 12/09/2019 11:33:31
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3B12.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer

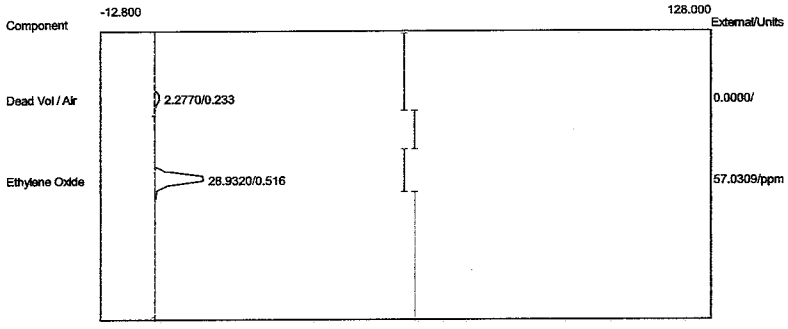


Component	Retention	Area	External	Units
Dead Vol / Air	0.200	72.9685	0.0000	
Ambient H2O	0.366	146.1720	0.0000	
Acetaldehyde	0.833	49.3830	0.0000	
		268.5235	0.0000	

APPENDIX G

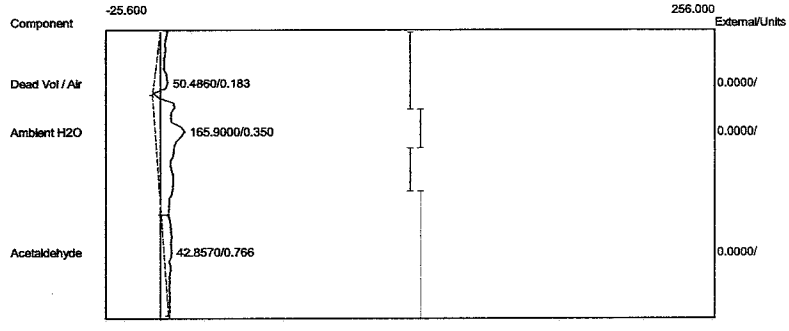
Run #3 Chromatograms – Aeration

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 11:36:19
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A01.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



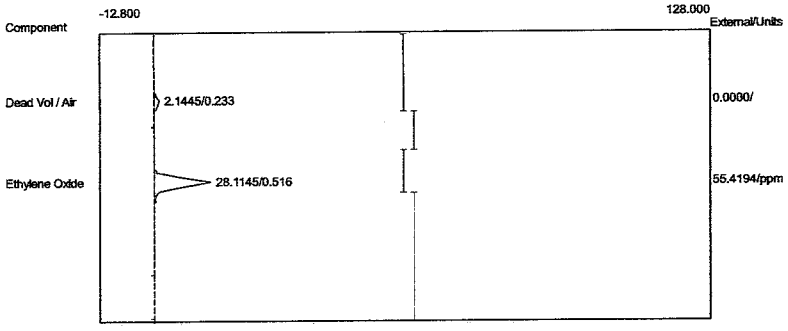
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.2770	0.0000	
Ethylene Oxide	0.516	28.9320	57.0309	ppm
		31.2090	57.0309	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 11:36:19
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A01.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



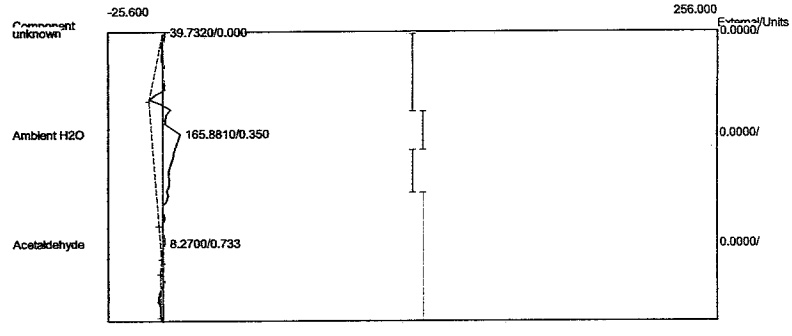
Component	Retention	Area	External	Units
Dead Vol / Air	0.183	50.4860	0.0000	
Ambient H2O	0.350	165.9000	0.0000	
Acetaldehyde	0.766	42.8570	0.0000	
		259.2430	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 11:41:34
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A02.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



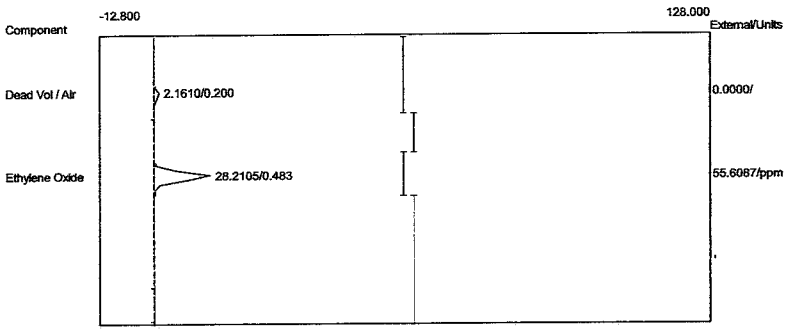
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.1445	0.0000	
Ethylene Oxide	0.516	28.1145	55.4194	ppm
		30.2590	55.4194	

Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 11:41:34
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A02.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



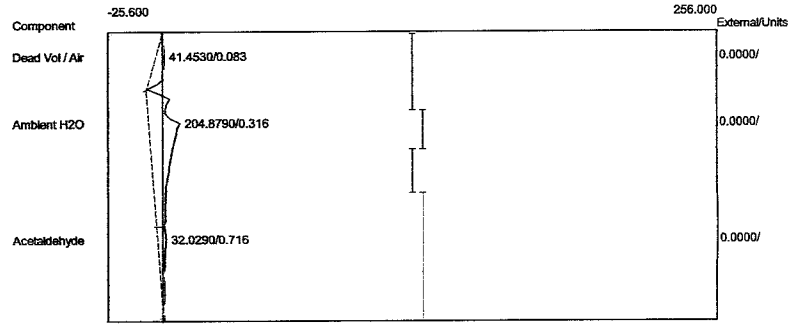
Component	Retention	Area	External	Units
Ambient H2O	0.350	165.8810	0.0000	
Acetaldehyde	0.733	8.2700	0.0000	
		174.1510	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 11:46:10
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A03.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



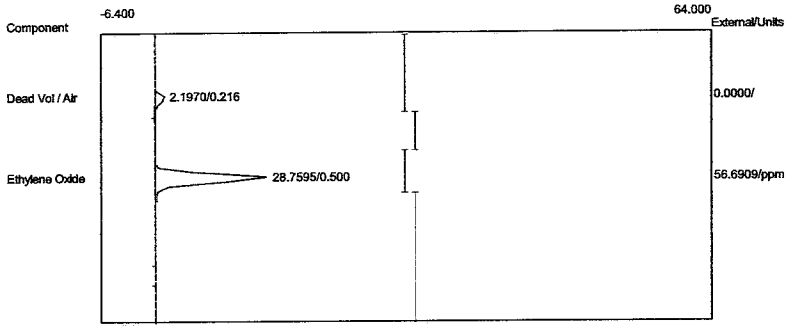
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	2.1610	0.0000	
Ethylene Oxide	0.483	28.2105	55.6087	ppm
		30.3715	55.6087	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 11:46:10
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A03.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



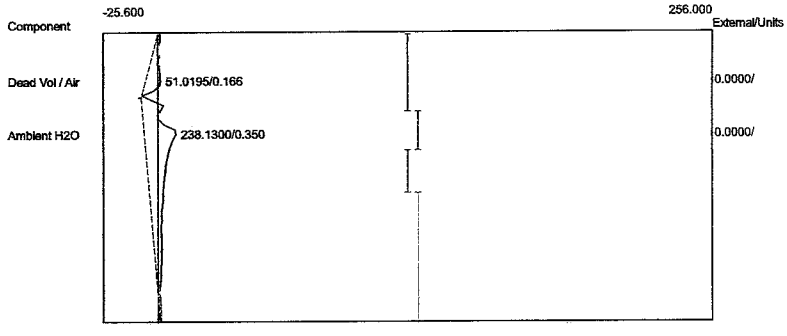
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	41.4530	0.0000	
Ambient H2O	0.316	204.8790	0.0000	
Acetaldehyde	0.716	32.0290	0.0000	
		278.3610	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 11:51:08
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A04.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



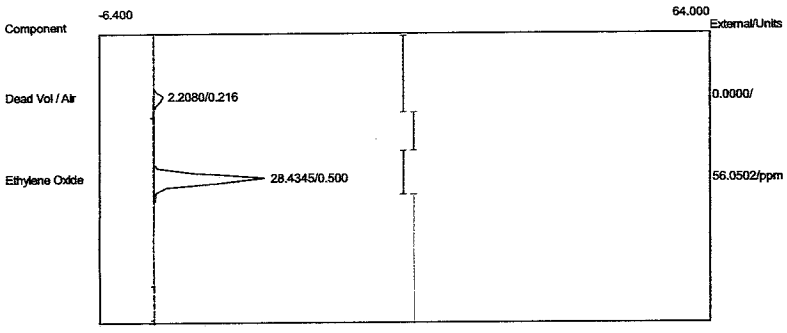
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1970	0.0000	
Ethylene Oxide	0.500	28.7595	56.6909	ppm
		30.9565	56.6909	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 11:51:08
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A04.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



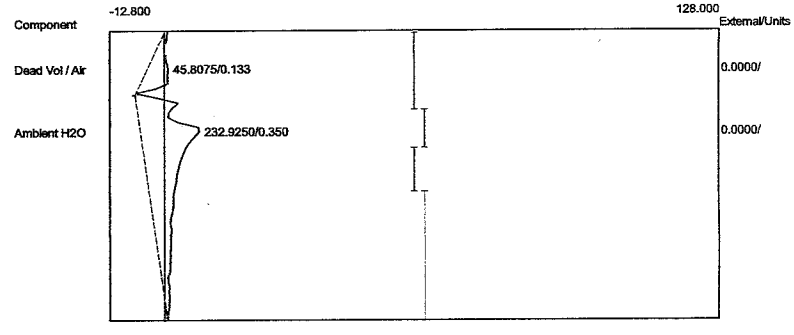
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	51.0195	0.0000	
Ambient H2O	0.350	238.1300	0.0000	
		289.1495	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 11:56:06
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A05.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



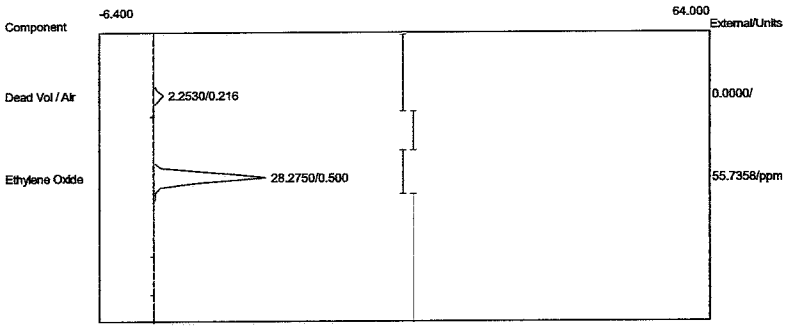
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2080	0.0000	
Ethylene Oxide	0.500	28.4345	56.0502	ppm
		30.6425	56.0502	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 11:56:06
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A05.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



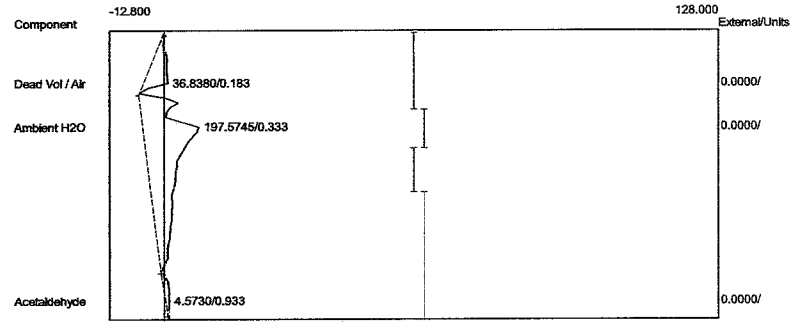
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	45.8075	0.0000	
Ambient H2O	0.350	232.9250	0.0000	
		278.7325	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:01:06
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A06.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



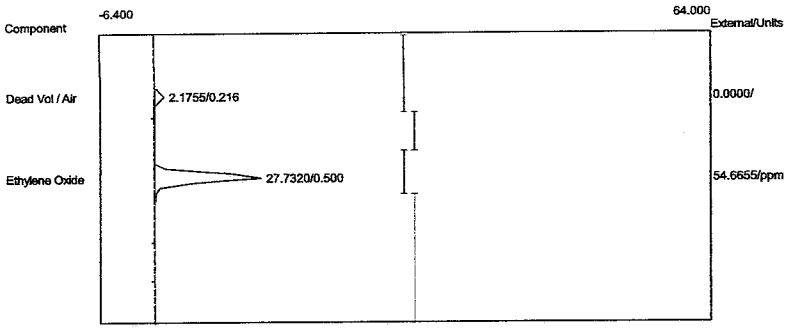
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2530	0.0000	
Ethylene Oxide	0.500	28.2750	55.7358	ppm
		30.5280	55.7358	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:01:06
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A06.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



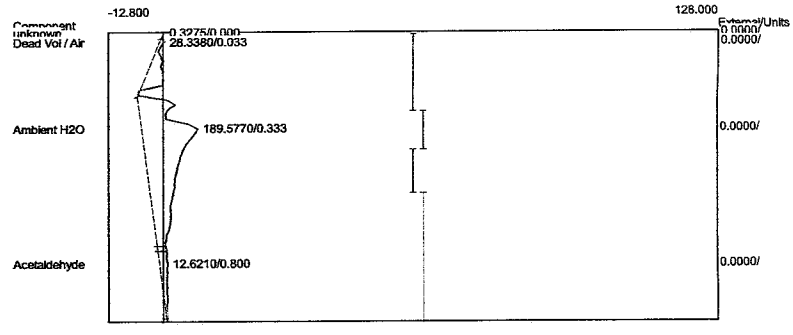
Component	Retention	Area	External	Units
Dead Vol / Air	0.183	36.8380	0.0000	
Ambient H2O	0.333	197.5745	0.0000	
Acetaldehyde	0.933	4.5730	0.0000	
		238.9855	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:06:38
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A07.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



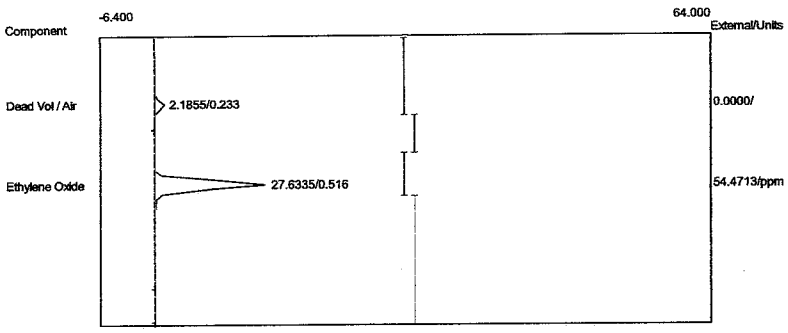
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1755	0.0000	
Ethylene Oxide	0.500	27.7320	54.6655	ppm
		29.9075	54.6655	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:06:38
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A07.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



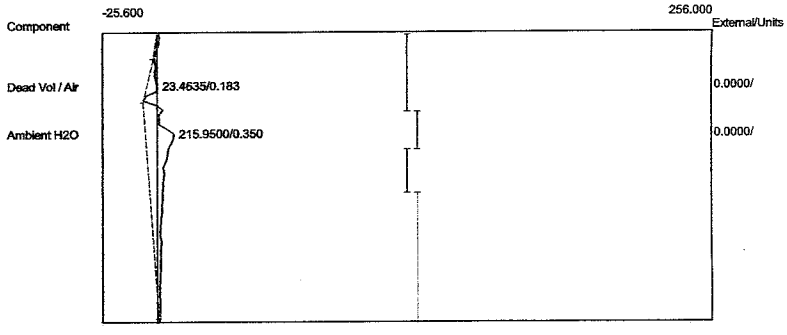
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	28.3380	0.0000	
Ambient H2O	0.333	189.5770	0.0000	
Acetaldehyde	0.800	12.6210	0.0000	
		230.5360	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:11:06
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A08.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



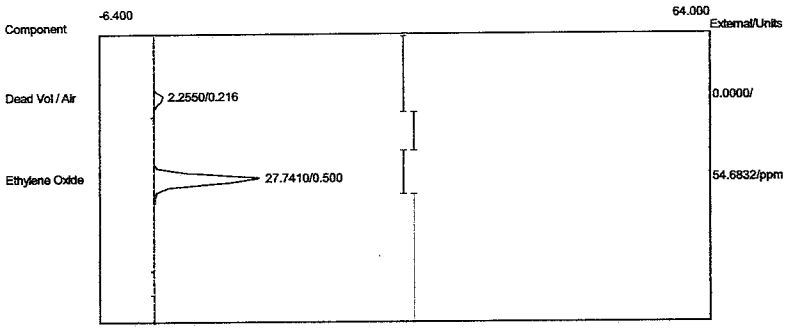
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	2.1855	0.0000	
Ethylene Oxide	0.516	27.6335	54.4713	ppm
		29.8190	54.4713	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:11:06
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A08.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



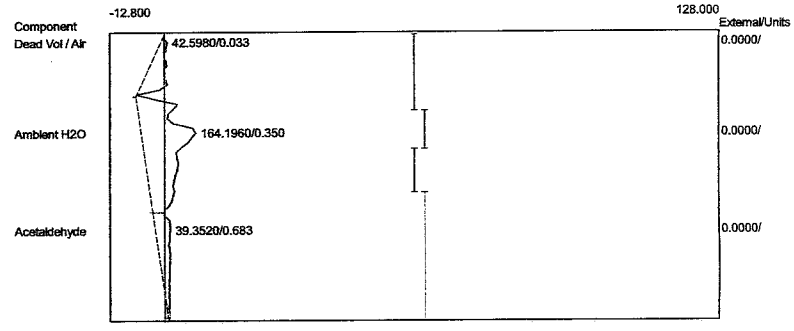
Component	Retention	Area	External	Units
Dead Vol / Air	0.183	23.4635	0.0000	
Ambient H2O	0.350	215.9500	0.0000	
		239.4135	0.0000	

Lab name: EGSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:16:06
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A09.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



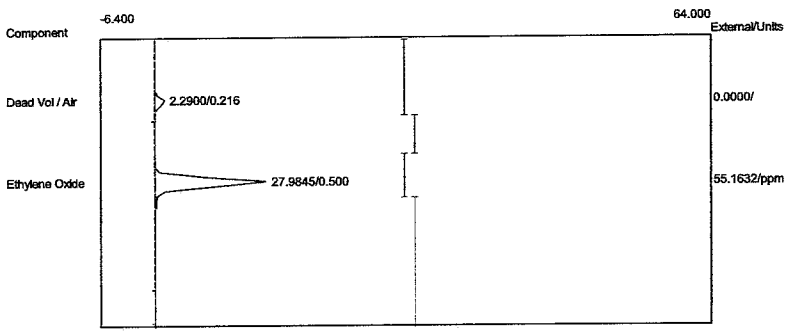
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2550	0.0000	
Ethylene Oxide	0.500	27.7410	54.6832	ppm
		29.9960	54.6832	

Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:16:06
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A09.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



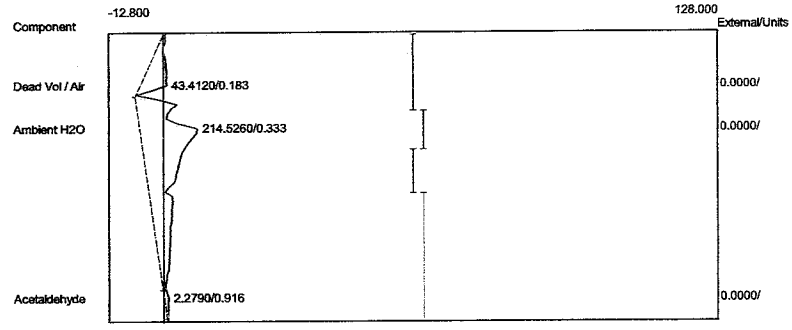
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	42.5980	0.0000	
Ambient H2O	0.350	164.1960	0.0000	
Acetaldehyde	0.683	39.3520	0.0000	
		246.1460	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:21:11
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A10.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



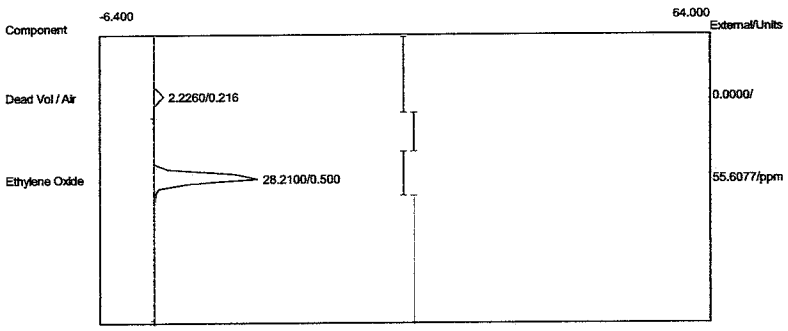
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2900	0.0000	
Ethylene Oxide	0.500	27.9845	55.1632	ppm
		30.2745	55.1632	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:21:11
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A10.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



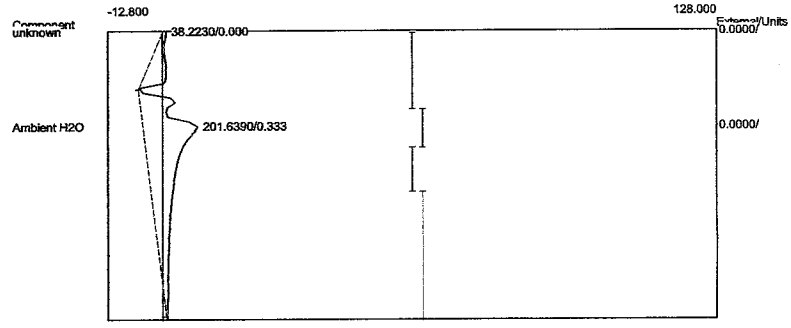
Component	Retention	Area	External	Units
Dead Vol / Air	0.183	43.4120	0.0000	
Ambient H2O	0.333	214.5260	0.0000	
Acetaldehyde	0.916	2.2790	0.0000	
		260.2170	0.0000	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:26:13
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A11.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



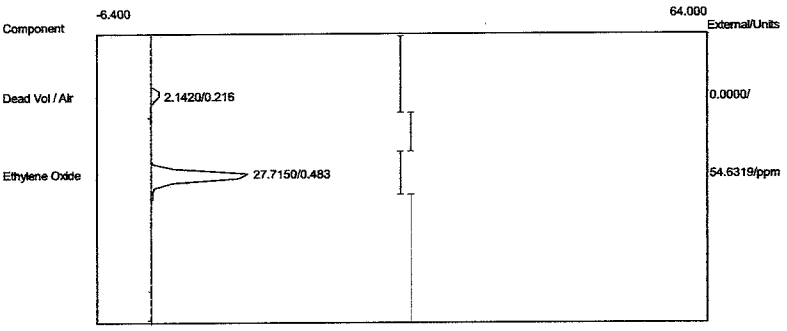
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.2260	0.0000	
Ethylene Oxide	0.500	28.2100	55.6077	ppm
		30.4360	55.6077	

Lab name: ECSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:26:13
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A11.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



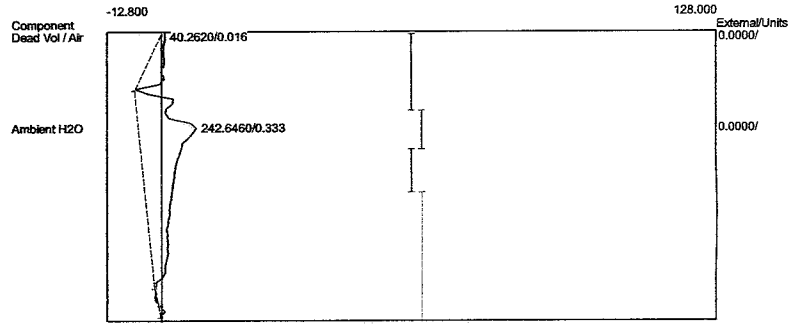
Component	Retention	Area	External	Units
Ambient H2O	0.333	201.6390	0.0000	
		201.6390	0.0000	

Lab name: EOSI
Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:31:14
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterCLT2019-3A12.CHR (c:\peak359)
Sample: Oxidizer Inlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.216	2.1420	0.0000	
Ethylene Oxide	0.483	27.7150	54.6319	ppm
		29.8570	54.6319	

Client: Sterigenics - Charlotte
Client ID: Run#3Aer
Analysis date: 12/09/2019 12:31:14
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterCLT2019-3A12.CHR (c:\peak359)
Sample: Oxidizer Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	40.2620	0.0000	
Ambient H2O	0.333	242.6460	0.0000	
		282.9080	0.0000	

APPENDIX H

Field Data and Calculation Worksheets

LOD Calculation EtO

Sterigenics - Charlotte, NC

12/9/2019

	Y =	A	+	m	x
Outlet	ppm =	-3.07E-02	+	0.643955	x area

Lowest Cal Gas

	Area	Calc ppm			
	1.89	1.186	ppm	LOD =	A+3s
	1.89	1.186	ppm	LOD =	0.042 ppm
	1.88	1.180	ppm		
AVG		**1.184**	ppm		
Std Dev		**0.004**	ppm		

1/2 LOD = 0.021 ppm

	Y =	A	+	m	x
Inlet	ppm =	0.01	+	1.98	x area

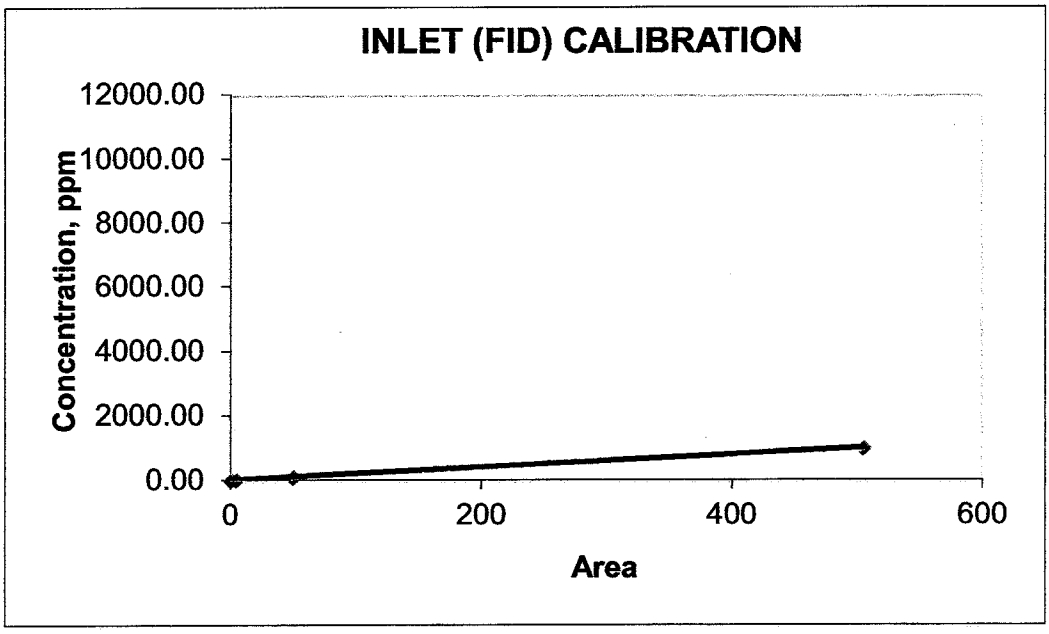
Lowest Cal Gas

	Area	Calc ppm			
	0.606	1.213	ppm	LOD =	A+3s
	0.613	1.227	ppm	LOD =	0.036 ppm
	0.611	1.223	ppm		
AVG		**1.221**	ppm		
Std Dev		**0.007**	ppm		

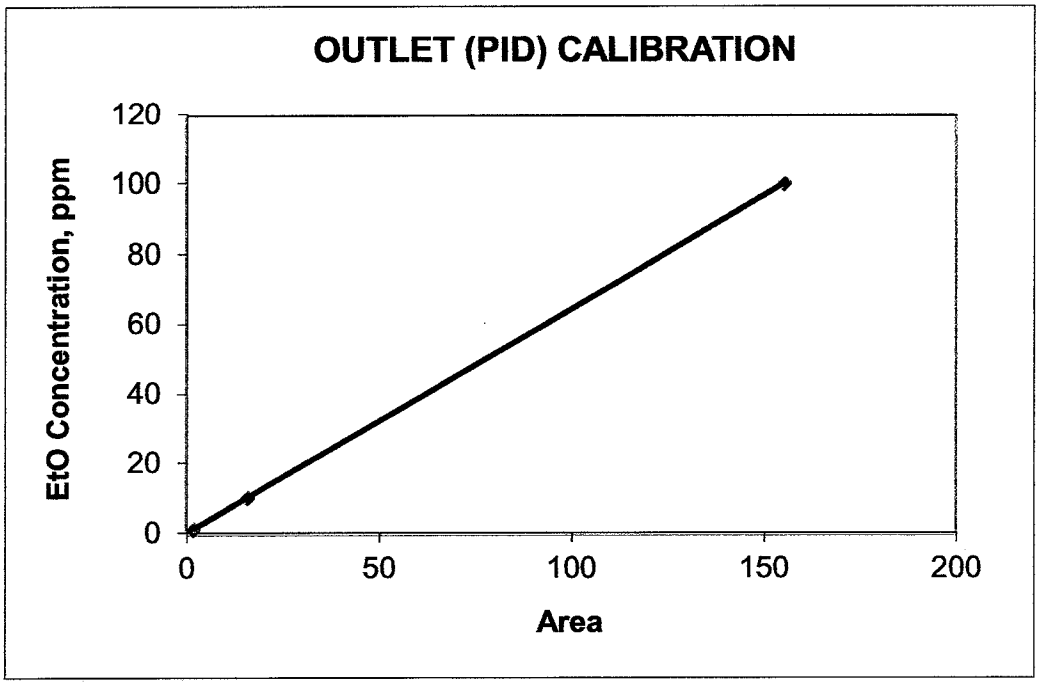
1/2 LOD = 0.018 ppm

EtO Calibrations

Site: **Sterigenics - Charlotte, NC**
Date: **12/9/2019**



Slope **1.98**
Intercept **0.01**



Slope **0.644**
Intercept **-0.0307**

EtO Calibrations

Site: Sterigenics - Charlotte, NC

Date: 12/9/2019

INLET - FID

ppm	0	1.18	10.2	100	1,000	10,080
Area 1	0	0.606	5.10	50.8	505	
Area 2	0	0.613	5.12	50.1	507	
Area 3	0	0.611	5.13	50.7	504	
AVG.	0	0.6100	5.117	50.53	505.3	

	AUDIT DIRECT	AUDIT BIAS
	52.0	52.0
	READS	READS
	51.5	52.1
Dev.	-1.0%	0.2%

OUTLET - PID

ppm	0	1.18	10.2	100
Area 1	0	1.89	16.0	155
Area 2	0	1.89	15.9	156
Area 3	0	1.88	15.9	155
AVG.	0	1.887	15.93	155.3

	AUDIT DIRECT	AUDIT BIAS
	52.0	52.0
	READS	READS
	51.4	51.3
Dev.	-1.2%	-1.3%

MID CAL			
	PPM	READS	Dev.
INLET			#DIV/0!
OUTLET			#DIV/0!

FINAL CAL			
	PPM	READS	Dev.
INLET	100	100.5	0.5%
OUTLET	1.18	1.19	0.8%

APPENDIX I

Gas Certifications

PRAXAIR
Making our planet more productive

Praxair Distribution, Inc.
ISO 9001 Registered
37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705

Praxair Order Number: **70905412**

Certificate Issuance Date: **3/15/2019**

Certification Date: **3/15/2019**
Lot Number: **70340 9067 8D**
Part Number: **NI EO1MP-A3**
DocNumber: **61840**
Expiration Date: **3/14/2021**

CERTIFICATE OF ANALYSIS

Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide	**1 ppm**	**1.18 ppm**	**1**	**± 0.1 ppm**
Nitrogen	**Balance**	**Balance**		

Cylinder Style: **A3**
Cylinder Pressure @ 70 F: **2000 psig**
Cylinder Volume: **28.2 ft3**
Valve Outlet Connection: **CGA 350**
Cylinder Number(s): **EA0023418**

Fill Date: **3/8/2019**
Analysis Date: **3/14/2019**

Filling Method: **Gravimetric**

Analyst: **Ronnie Popularas**

QA Reviewer: **Anthony Perret**

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are either prepared by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada, or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

PRAXAIR
Making our planet more productive

Praxair Distribution. Inc.
ISO 9001 Registered
37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705

Praxair Order Number: **70905412**

Certificate Issuance Date: **3/15/2019**

Certification Date: **3/15/2019**
Lot Number: **70340 9067 8E**
Part Number: **NI EO10MP-A3**
DocNumber: **61842**
Expiration Date: **3/14/2021**

CERTIFICATE OF ANALYSIS

Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide	**10 ppm**	**10.2 ppm**	**1**	**± 1 %**
Nitrogen	**Balance**	**Balance**		

Cylinder Style: **A3**
Cylinder Pressure @ 70 F: **2000 psig**
Cylinder Volume: **28.3 ft3**
Valve Outlet Connection: **CGA 350**
Cylinder Number(s): **EA0022418**

Fill Date: **3/8/2019**
Analysis Date: **3/14/2019**

Filling Method: **Gravimetric**

Analyst: **Ronnie Popularas**

QA Reviewer: **Anthony Perret**

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are either prepared by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada, or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

PRAXAIR
Making our planet more productive

Praxair Distribution. Inc.
ISO 9001 Registered
37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705

Praxair Order Number: **70953858**
Customer PO Number: **78936543**

Certificate Issuance Date: **5/6/2019**

Certification Date: **5/6/2019**
Lot Number: **70340 9119 1F**
Part Number: **NI EO100P-A3**
DocNumber: **71177**
Expiration Date: **4/30/2021**

CERTIFICATE OF ANALYSIS

Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide	**100 ppm**	**100 ppm**	**1**	**± 1 %**
Nitrogen	**Balance**	**Balance**		

Cylinder Style: **A3**
Cylinder Pressure @ 70 F: **2000 psig**
Cylinder Volume: **28.7 ft3**
Valve Outlet Connection: **CGA 350**
Cylinder Number(s): **EA0023428**

Fill Date: **4/29/2019**
Analysis Date: **4/30/2019**

Filling Method: **Gravimetric**

Analyst: **Ronnie Popularas**

QA Reviewer: **Blayne Griffin**

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are either prepared by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada, or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

CERTIFIED WORKING CLASS

Single-Certified Calibration Standard

Scott Specialty Gases

2300 CAJON BLVD., SAN BERNARDINO, CA 92411 Phone: 909-887-2571 Fax: 909-887-0549

CERTIFICATE OF ACCURACY: Certified Working Class Calibration Standard

Product Information
Project No.: 02-57164-005
Item No.: 0202000134OTCL
P.O. No.: VBL – D. KREMER

Cylinder Number: CLM002810
Cylinder Size: CL
Certification Date: 20Apr2018

Customer

ECSI, INC
PO BOX 1498
SAN CLEMENTE, CA 92674

CERTIFIED CONCENTRATION

Component Name	Concentration (Moles)		Accuracy (+/-%)
ETHYLENE OXIDE	1,000.	PPM	5
NITROGEN		BALANCE	

TRACEABILITY

Traceable To

Scott Reference Standard

APPROVED BY: B. McCall BLM DATE: 4-20-18

SPECIFICATIONS

Component Name	Requested Concentration (Moles)		Certified Concentration (Moles)		Blend Tolerance Result (+/- %)	Certified Accuracy Result (+/- %)
ETHYLENE OXIDE	1,000.	PPM	1,000.	PPM	.0	5.00
NITROGEN		BAL		BAL		

TRACEABILITY

Traceable To
Scott Reference Standard

PHYSICAL PROPERTIES

Cylinder Size: CL

Pressure: 1200 PSIG
Expiration Date: 20Apr2020

Valve Connection: CGA 350

SPECIAL HANDLING INSTRUCTIONS

Do not use or store cylinder at or below the stated dew point temperature. Possible condensation of heavier components could result. In the event the cylinder has been exposed to temperatures at or below the dew point, place cylinder in heated area for 24 hours and then roll cylinder for 15 minutes to re-mix.

Use of calibration standards at or below dew point temperature may result in calibration error.

COMMENTS

CERTIFIED WORKING CLASS

Single-Certified Calibration Standard

Scott Specialty Gases

2600 CAJON BLVD., SAN BERNARDINO, CA 92411 Phone: 909-887-2571 Fax: 909-887-0549

CERTIFICATE OF ACCURACY: Certified Working Class Calibration Standard

Product Information
Project No.: 02-57164-006
Item No.: 02020001340TCL
P.O. No.: VBL – D. KREMER

Cylinder Number: CLM005787
Cylinder Size: CL
Certification Date: 20Apr2018

Customer

ECSI, INC
PO BOX 1498
SAN CLEMENTE, CA 92674

CERTIFIED CONCENTRATION

Component Name	Concentration (Moles)		Accuracy (+/-%)
ETHYLENE OXIDE	10,080.	PPM	5
NITROGEN		BALANCE	

TRACEABILITY

Traceable To

Scott Reference Standard

APPROVED BY: B. McCully BLM DATE: 4-20-18

SPECIFICATIONS

Component Name	Requested Concentration (Moles)		Certified Concentration (Moles)		Blend Tolerance Result (+/- %)	Certified Accuracy Result (+/- %)
ETHYLENE OXIDE	10,000.	PPM	10,080.	PPM	.8	5.00
NITROGEN		BAL		BAL		

TRACEABILITY

Traceable To
Scott Reference Standard

PHYSICAL PROPERTIES

Cylinder Size: CL

Pressure: 700 PSIG
Expiration Date: 20Apr2020

Valve Connection: CGA 350

SPECIAL HANDLING INSTRUCTIONS

Do not use or store cylinder at or below the stated dew point temperature. Possible condensation of heavier components could result. In the event the cylinder has been exposed to temperatures at or below the dew point, place cylinder in heated area for 24 hours and then roll cylinder for 15 minutes to re-mix.

Use of calibration standards at or below dew point temperature may result in calibration error.

COMMENTS

CERTIFICATE OF ANALYSIS

Customer Name:	Environmental Compliance Specialists, Inc	**Cylinder Number:**	CAL-4448
Stock / Analyzer Tag #:	A006-1040-50PNC	**Product Class**	Certified Standard
Customer Reference:	Verbal Dan	**Cylinder Contents (1):**	28 CF @ 2000 PSI
MESA Reference:	124691	**Cylinder CGA:**	A006-HP-350/BR
Date of Certification:	April 17, 2019	**Analysis Method:**	GC-TCD
Recommended Shelf Life:	2 Years	**Preparation Method:**	Gravimetric

Component	**Requested Concentration (2)**	**Reported Concentration (2,3)**
Ethylene Oxide	50 ppm	52 ppm
Nitrogen	Balance	Balance

Authorized Signature: _____

(1) The fill pressure shown on the COA is as originally quoted. The fill pressure measured by the customer may differ from the fill pressure originally quoted due to temperature effects, compressibility of the individual components when blended together in the cylinder, gauge accuracy or reduction in content volume before shipping as a result of samples withdrawn for laboratory QC necessary to ensure product quality.
(2) Unless otherwise stated, concentrations are given in molar units.
(3) Vapor pressure mixes are blended at a sufficiently low pressure so as to eliminate phase separation under most low temperature conditions encountered during transport or storage. However, it is generally recommended that cylinders containing vapor pressure restricted mixes be placed on the floor in a horizontal position and rolled back and forth to improve homogeneity of the gas phase mixture before being put into service.

Analytical Gas Standards are prepared and analyzed using combinations of NIST traceable weights, SRM's provided by NIST, or internal gas standards that have been verified for accuracy using procedures published by the US-EPA. Pure gases are analyzed and certified for purity using minor component Analytical Gas Standards prepared according to the methods specified above. Balances are calibrated to NIST test weights covered by NIST test number 822/278982-10. Reference Certification #'s:1072/Z, 833/AB and 3280/H.
Calibration methods are in conformance with MIL-STD 45662A.

MESA Specialty Gases & Equipment
division of MESA International Technologies, Inc.
2427 S. Anne St. • Santa Ana, California 92704 • USA
TEL: 714-434-7102 • FAX: 714-434-8006 • E-mail: mail@mesagas.com
On-line Catalog at www.mesagas.com